MAR 19 1935

Engineering News-Record

Twenty-five cents, five dollars per year McGraw-Hill Publishing Company, Inc.

February 7, 1935

THE YEAR'S PROGRESS

CODES

ENGINEERING

NEW DEAL ACTIVITIES

DROUGHT

CONSTRUCTION

BUSINESS

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For Contracts to Fit the Need

SOME of the talk about the proposed $4,000,000,000 emergency construction program reveals the existence of two widely held but quite mistaken impressions as to the conduct of construction. They result, naturally enough, from a general unfamiliarity with the functions, organization and operation of the construction industry.

The first of these is the notion that construction carried on by contract must necessarily be subject to conditions that make for excessive rigidity and high costs. It is thought, therefore, that contract work is bound to be slow in getting under way and that it must observe wage scales that will limit the extent to which a given expenditure can spread employment.

This, of course, is not so. Given prescribed wage scales and material prices that will apply equally to both, the only essential difference between a job awarded by bid to a qualified contractor and one undertaken by day-labor is all to the advantage of the former. The contract job will have the benefit of handling by an experienced, close-knit and matured staff, its members selected on the basis of special fitness and its operations directed and driven by a man who, through his competitive bid, has staked his right to business survival on his ability to keep costs within that bid and to return to his customer, in this case the taxpayer, the greatest possible value for the expenditure.

On the day-labor job these valuable factors will be lacking. It is quite possible that a day-labor job, when done by a permanent organization of special training and experience, engaged continuously on construction work, may be handled creditably with respect to cost and other aspects of performance. But at best it will lack the spur that goads the contractor to efficient performance, and at worst it fosters woeful waste, killing delay and, in the case of government work, demoralizing political exploitation. Any improvised governmental day-labor agency, of the size and scope required by the proposed effort, certainly would develop the worst characteristics of its type rather than the best.

Bearing all this in mind, it is a mistake to assume, as some have done, that the evils of day-labor management must be suffered in order to insure speed, flexibility and a widespread distribution of employment. Regardless of the routine procedure of normal times, it is perfectly feasible to prepare a form of contract that will meet the present emergency with advantage to all concerned. It is possible to enjoy all the advantages of the competitive contract system and, at the same time, prescribe any scales or other determining standards of cost that the President might consider desirable to meet the special conditions.

He can have, if he will, the all-important advantage of thousands of established and qualified organizations the country over, ready and waiting to go into action on a competitive basis, coupled with all the flexibility of a direct-employment system. If he will but sit down with a few selected contractors of established responsibility and define his objectives, he undoubtedly could work out with them very quickly a form of contract that would fit the circumstances, give him just the results he seeks and save the taxpayer from unconscionable waste and exploitation. At the same time he would be giving to the sorely harassed construction industry a chance to avert the danger of grave injury or possible extinction.

Another of these misunderstandings as to the construction industry has to do with its peculiar claims on the New Deal. It will be discussed on this page in next week's issue.

Willard Chevalier

ENGINEERING NEWS-RECORD

Published every Thursday. Vol. 114, No. 6. Price 25c. per copy. Subscription, domestic, Mexico, Central and South American countries, $5 per year. Canada, including duty, $7.50. All other countries, $9 a year or 36 shillings. Entered as second-class matter April 11, 1917, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U.S.A. Cable Address "McGrawhill, New York." Member A.B.P. Member A.B.C. Copyright 1935 by

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

Editorial and Publishing Offices: 330 West 42d Street, New York; 520 North Michigan Avenue, Chicago; 883 Mission Street, San Francisco; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C.

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This rigid frame concrete bridge is one of two built in 1934 by Road Commissioners of Wayne County, Michigan. Built on piles, the bridge has a clear span of 60 feet, a 40-foot roadway and two 6-foot sidewalks

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In the News:

REGULATION of the Colorado River at the Boulder Dam Reservoir, with its 26,000,000-acre-ft. capacity, was started on Feb. 1, when the bulkhead gate at the upstream portal of Tunnel No. 4 was closed.

AN INVESTIGATION of the federal government's land and water policies has been authorized by the Senate, to be conducted by a special committee on which the public lands, irrigation and reclamation, and agriculture and forestry committees will be represented.

THE $4,880,000,000 WORKS-RELIEF BILL is still before the Senate Appropriations Committee for consideration. Rapid passage of the act will be necessary if the funds are to become available before present relief money is exhausted.

CONDEMNATION PROCEEDINGS have been started by the PWA, inaugurating a low-rent housing project in Boston, to accommodate 960 families on a 19-acre site.

EFFORTS TO ELIMINATE the federal gasoline tax are being pushed.

AN ALLOTMENT of $3,780,000 has been made by the PWA to the Treasury Department for building a power plant in New York City, to supply government buildings.

A CONTRACT for $703,827, awarded the Morrison-Knudsen Co. by the Corps of Engineers for improving the Calumet waterway, is considered the first step in a $20,000,000 program on the Illinois-Mississippi River development.

C. H. HOWELL, for many years chief engineer of the Middle Rio Grande Conservancy District, N. M., has been appointed chief engineer of the Los Angeles County Flood Control District.

IN THE CLOSING SESSION of the A.G.C. convention in Washington last week a high NRA official stated that contractors need not worry about the methods which will be used in carrying out the new $4,000,000,000 works program.

A DEFINITE LIST of 4,058 grade-crossing eliminations estimated to cost $460,000,000 has been prepared as one feature of a works survey made by the American Association of State Highway Officials.

THE HOLING-THROUGH ceremony on the 20,000-ft. Twin Lakes Tunnel in Colorado was held on Feb. 4.

In This Issue:

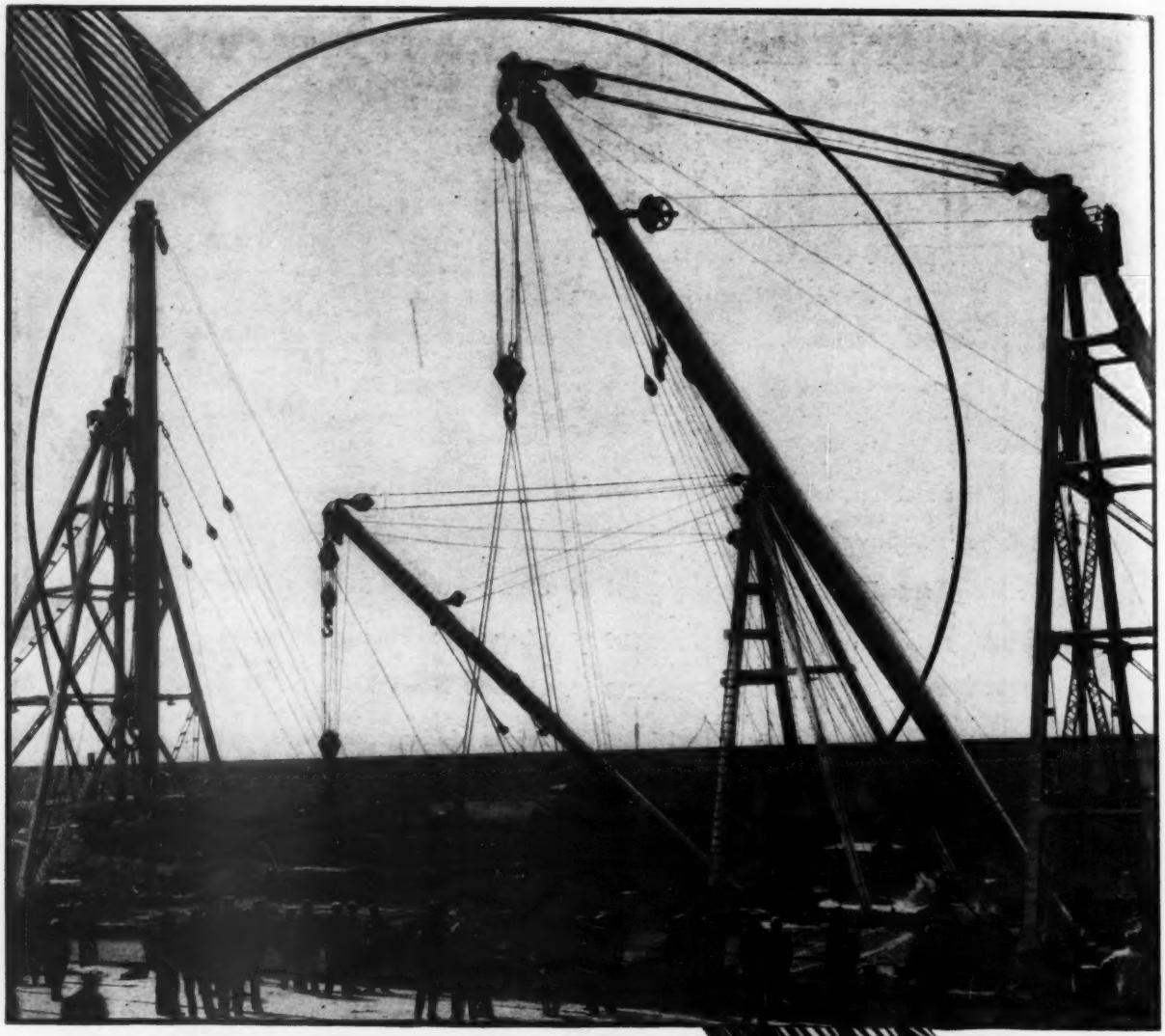
THIS ISSUE presents the review made annually by *Engineering News-Record*, to record the events and development of the preceding year and outline the prospects for the coming months. The year 1934 in the construction industry and related fields is reviewed, with a broad coverage by well-qualified writers.

Codes and code problems were outstanding in 1934, and the feature of the issue is a group of articles contributed by high authorities in construction code formation and administration. The NRA code system as a whole is also reviewed. A factual review of the drought, a discussion of the housing problem, accomplishments of the PWA and work-relief efforts, a statistical review of construction in 1934 and an outline of the general business picture are features of this number. Notes on the status of the major engineering projects and the editorial review of events in all fields of civil engineering interest complete the contents of the issue.

Coming Articles:

EXPERIENCE in sinking deep caissons on the San Francisco-Oakland Bridge is the subject of the next article in the series on this structure by Messrs. Purcell, Andrew and Woodruff, which will be published soon. These caissons were put down to record depths—240 ft. below water level as a maximum—and "incidents which might have developed into serious accidents," to use the words of the authors, are described in detail. The advantages of dome-capped-cylinder caissons are compared with those of false-bottom caissons; both types were used successfully on this bridge, on which the foundation work has just been completed.

NEW THINKING and extensive investigations are being applied to appraising the properties and qualities of mineral aggregates as they affect road surfacing, both bituminous and portland cement. The important work that has been done in this field by the Bureau of Public Roads will be reviewed by F. H. Jackson, senior engineer of tests, in an article to be published soon.



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ENGINEERING NEWS-RECORD

New York

February 7, 1935

1934 • PROGRESS AND OUTLOOK • 1935

Advance Toward Recovery

After a year of slow advance, halting but after all continuing, the country and with it the construction world are able to look forward more confidently than at any time since the economic breakdown. Many business indicators moved upward in the twelve months. Production and employment increased, the national income became a fourth larger than in the previous year, and a few consumption and intermediate lines even passed their normal pre-depression volume. More significant than increase in consumable goods, which might be attributed to more extensive relief service, is a gain in the durable-goods field. And most important of all is the fact that construction activity grew steadily, though so slowly that the growth could hardly be noticed. Construction had its first upturn from a long and calamitous decline. These substantial results afford a trustworthy base on which to rest calculations as to the future.

In appraising the advance it is in order to recall the situation of a year ago, when the tumultuous events of the first period of reconstruction—fiscal and financial reorganization measures, codification of industry, inauguration of the public-works campaign and associated reemployment efforts—were still in progress and the country had hardly begun to adjust itself to them. A substantial amount of adjustment has since been realized, many apprehensions have subsided and doubts as to the survival of personal initiative have met brilliant disappointment. Thus, the psychological as well as the statistical situation is better, and the outlook therefore more assured.

Some Setbacks

● Together with the advances, the setbacks experienced during the past year need to be kept in mind, for they too bear on the future. Chief of them were the Mid-West drought, extensive and violent labor disturbances, and the effects of persistently inactive capital. Labor disturbance has long been held to be an inevitable accompaniment of recovery from a depression, and part of the 1934 crop of strikes may be accounted for by this connection. Others were clearly a sequel of the ill-starred NRA venture, with its utter lack of principle and firm policy in establishing the fundamentals of industrial relations. Together they resulted in losses unquestionably of large amount; as an instance, the longshoremen's strike along the Pacific Coast during the summer is reported to have produced industrial paralysis and commercial loss totaling as much as the federal recovery funds allocated to that region. The labor situation is no clearer or more satisfactory now.

The crop losses arising from the drought exerted a strongly depressing influence on business courage during the summer and thus cooperated with other causes of the 1934 summer slump. But in final effect they were on the whole constructive, both by remedying the crop-surplus maladjustment and by inducing various corrective actions: improvement of water supplies, voluntary abandonment of farming lands in the Great Plains marginal areas, and more definite governmental action to readjust land use.

Construction and This Issue

● Throughout the major developments of the year, construction has been closely concerned. It not only was the central feature of the PWA and the work-relief programs—leaders among the year's recovery activities—but it formed the ultimate objective of the new resource study and planning that made large progress during the year both nationally and in the states. The many efforts to revive housing, especially the ambitious Federal Housing Administration program, initiated by the Housing Act of last summer, also relate to basic problems of the construction industry.

Thus, the dominant interests of engineering and construction today are associated with phases of the national recovery campaign, and these accordingly have been made the main theme of the present survey of progress. A comprehensive series of articles on the

construction codes is therefore presented, introduced by an incisive review of the NRA system as a whole. The activities of the PWA and the CWA are summarized in authoritative manner. The employment and labor aspect of recovery, analyzed by the Bureau of Labor Statistics, brings out the continuing low level of the construction and durable-goods industries despite substantial percentage gains in the past year. The drought is reviewed, and the fundamental beginning in resource study is outlined. Housing obstacles are discussed by a close student of the subject.

These special articles are supplemented by our annual editorial review of engineering progress, a series of reports on the present state of large engineering projects throughout the country, a record of business developments, and *Engineering News-Record's* statistical summary and forecast of construction.

The Year in Nature

● Natural phenomena in this country during 1934 were abnormal only in the drought and the great heat that accompanied it. No large floods occurred, and there was no important visitation of either major storm or earthquake. Outstanding as to duration, extent and intensity, with the addition of high temperatures, the drought of last summer was the more noteworthy for following so soon after the eastern drought of 1930-31. Moreover, in the entire western half of the country it came as the climax of a period of low-rainfall years. The low level of Great Salt Lake, lower even than in 1905, its previous minimum, is an index of a general long-term shortage of precipitation in the West.

This and the dry years immediately preceding have forewarned most cities and are causing the more careful waterworks designers to increase their storage requirements. Increased appreciation of groundwaters as a natural resource has developed.

Study of Resources

● A lasting distinction of the year 1934 is that it brought the beginning of a broad movement to survey and inventory the country's natural resources, in preparation for a study of how they may best be conserved and used to the advantage of this and succeeding generations. It is an interesting parallel to the conservation movement that flourished in the other Roosevelt's presidency, three decades ago, but the present one is more fundamental in its attack. The attempt has been made to deal by inventory or well informed survey with the facts of land, water and minerals. Curiously enough the movement was not begun by deliberate intent, but grew up out of the odd proviso of the National Industrial Recovery Act that a comprehensive plan of public works should be prepared as the basis for allotting money from the $3,300,000,000 fund appropriated for recovery construction. Of course no such plan could be set up on the spur of the moment, and the Public Works Administration proceeded to make allotments without one; but it organized the National Planning Board to study out a plan. This body, reconstituted last July as the National Resources Board, published an elaborate report a month ago whose substantial part is a water resources inventory and recommendations as to policies of land and mineral control based on sketch reconnaissances. This work is only a starting point. Fortunately the President has recommended to Congress that a permanent National Resources Board be established. Thus there is prospect for continuing study of our physical assets and their best use and coordination with the social and economic requirements of the regions concerned.

Planning Makes Progress

● Originating in the national planning and resource study movement, a broad appreciation of the need for studying existing conditions and correlating improvement plans to them has grown up within the past two years. State planning boards are at work in most states, and some regional groups are similarly organized. We are collating many data on what we have and acquiring some conception of what we have done with the country up to now, good, bad and indifferent.

The states have been activated to a sense of their obligations to their people and are learning much from the inventories. Attempts are being made in some places to set up improvement programs and priority budgets. Control measures based on planning have been applied in a small way in county zoning and submarginal land selection.

The related work of city planning has been restricted in practical application by meager funds, but some results have come from real-property inventories. Low-cost housing is not yet being correlated effectively with general city plans. However, officials are learning that slum areas are costly to maintain, and a few are doing something about it.

Tennessee Valley Project

● Our only large-scale attempt at applied economic planning for a region, the Tennessee Valley undertaking, progressed rapidly during 1934 in its dam and power operations, but little in agricultural, industrial and social improvement activities. Norris and Wheeler dam construction went forward in workmanlike manner, and late in the year Pickwick dam saw the start of preliminary operations. Power from Muscle Shoals was supplied to several cities through purchased transmission lines, and early service over the line built by the TVA to connect Muscle Shoals with Knoxville and Norris is contemplated. Injunction suits late in the year brought the legality of power distribution by the TVA into question, however, and the new business many proceed only slowly until the question is decided by the Supreme Court. For the present the possibilities of regional economic planning cannot be said to have been made much clearer by the TVA's operations than they were a year ago.

Boulder Dam Nears Completion

● The amazingly rapid progress of Boulder Dam continued during 1934, and in its course the last major technical problems of the work came to successful solution with effective accomplishment of cooling and grouting of the sectionalized dam structure and installation of a substantial part of the great welded penstocks. By the end of the year the dam had progressed near to completion, and formal celebration of placing of the last yard of concrete is expected within a month. Preparation for closing the diversion tunnels had been made long before, but water storage could not be begun because of the low river flow. Finally on Feb. 1, about eighteen months ahead of the original schedule, the bulkhead gate

of No. 4 tunnel was dropped, enabling water to be stored as rapidly as surplus river flow permits.

Beginning of work on the All-American Canal and on Parker Dam promises early completion of the basic Colorado River development. Its features of federal power production and river control are being paralleled to some extent in the works on the Columbia and Missouri, included in the emergency construction program.

Construction Activity

● The downward trend of construction activity prevailing since 1928 was reversed in 1934 with an indicated total of $3.1 billions representing a dollar gain of 27 per cent over the previous year and a gain in physical volume of 4.10 per cent. State and municipal public works, coupled with the largest federal construction program in peace-time history, were responsible for the increase, as private work fell to a new low. Contract and day-labor work started by the federal government last year exceeded half a billion dollars in value; state and municipal work approached two billions. Residential building remained at low ebb, while private engineering construction reflected the dearth of industrial and commercial building with a loss of one-fourth of the 1933 volume, dropping to a total of only 9 per cent of 1929, the peak year for private work. Indications point to a continued gain in construction activity, with this year's volume estimated at $4 billions, which would still be less than half that of 1926 usually regarded as a normal construction year.

The Contractor's Position

● Few businesses have suffered from the effects of the depression to the extent that has contracting. The tremendous loss in volume of work available has created devastating competition, with resulting ruinous prices. In the struggle for existence contractors have seen their reserves and other assets depleted, their organizations disrupted and their equipment pass into obsolescence. The result has been a wholesale scaling down of financial standing and qualifications. Large firms have found it necessary to form combinations to handle work that most of them could have taken care of individually in the past; some of the smallest have been squeezed out of existence. However, the situation has been slightly improved through survival of the fittest, and these survivors now seem determined to cease bidding below cost. The code also offers real possibilities in the way of bettering competitive conditions. On the other hand day labor presents an increasing threat to contracting. The hope of contracting today lies in the proof that construction by relief labor and by force-account methods is inefficient and often highly wasteful. The contractor will not and cannot be eliminated from the construction field.

Engineers and Employment

● Engineers and architects continued to suffer badly from unemployment during the year, the chief bright spot for engineers being the large number of men given temporary employment on the federal survey work. Expansion of the PWA inspection activities created quite a number of jobs of somewhat more permanent character than the survey work. Prospects for a large amount of survey work during the coming year are good.

Unemployment conditions among engineers were aggravated by a quite general movement on the part of municipalities to transfer engineering work that should be done by their regular forces to relief agencies. Government competition with both engineers and architects continues to have a serious effect upon the members of those professions who are in private practice. But the net result of 1934 was definite increase in engineering employment, and 1935 bids fair to follow this trend.

The Public-Works Campaign

● Carrying forward the first great trial of the plan of balancing industrial inactivity by a concentrated public-works campaign and thereby initiating recovery, the Public Works Administration during 1934 disbursed about $800,000,000 in wages and gave employment to nearly a million men otherwise idle. After its utter failure to create any substantial employment during the critical first six months from June to December, 1933, the PWA made an important contribution to the national well-being with its 1934 performance. About half the money appropriated remains to be spent, and therefore a like constructive influence on employment will be realized in the coming year.

Under the circumstances it cannot be said that the business-recovery value of public works has been either proved or disproved. The PWA work was spread too thin to have the stimulating effect on general business that was hoped for.

More Recovery Works

● Because of the effect of the CWA in causing states and cities to lean on the federal government for financing their relief needs, and because of the mounting burden of relief, the President has concluded that the federal treasury must cease paying relief doles and that federal aid should be given only through a $4 billion works program. This significant change of policy represents a further victory of the public-works plan of dealing with economic emergency. Budgeting of the new program began in October. The appropriation bill now before Congress does not specify how the money is to be expended but is known to be designed to provide construction employment. The President's opening message indicated that highway improvement, grade-crossing elimination, housing and rural electrification, as well as non-federal projects (state and city works) are to be carried out. Organization and procedure are still unknown. With the present relief roll of about 20,000,000 people, it is open to question in view of past PWA results whether the new program can give a sufficiently powerful push to business to speed up recovery.

Under the Code

● The construction industry has been codified for almost a year. Non-compliance, lack of funds and the discouraging delay in approval of vital sub-chapters IIA, IIB, and IIC have placed severe handicaps upon code administration, and so far the code has had but little effect. Yet there is determined hope that it can be made to work as soon as full compliance is obtained.

Under the Recovery Act, the code system of the NRA comes to an end next June. Whether it is to be continued is one of the biggest questions before industry.

Business and manufacture favor its continuation in revised form, without being clear on the kind of revision. Construction also favors continuance. But a chaotic mass of problems must be cleared up by Congress before deciding to continue the code system, if industrial operation is to be better assured in the coming year. The present confusion and doubt is one of the things that make business and new construction planning uncertain.

Activity in relation to the architects' and engineers' chapters of the construction industry codes came to a standstill in the early summer of 1934. In recent months there have been reports at intervals that the engineers' or the architects' code was about to be approved, but no action has materialized. In the meantime, both engineers and architects are members of the code and are subject to the general provisions of Chapter I.

Advancing Construction Technique

● Advance of construction technique is accelerating both because the small volume of work means low bid prices and therefore requires ingenuity on the part of the contractor to keep out of the hole and because projects of gigantic size call for new skill and new methods in their execution. During the year the second factor has been the more influential. Some of the large projects show noteworthy advances. Continued breaking of tunneling records on the Colorado River Aqueduct, the sustained high performance on Boulder Dam, the success of deep caisson and cofferdam work on the Bay bridge, belt conveyor disposal of spoil at Grand Coulee and Fort Peck, and the driving of steel sheetpiling to unprecedented depths, are typical of current construction achievement. Equipment manufacturers are continuing to contribute to the improvement of construction.

Housing Still Stagnant

● Definite developments and some progress were recorded in the housing field during the year but for the most part the stagnant condition of actual building operations still persisted. It seems certain that until some formula for loosing private purse strings is found this class of construction will not be a major factor in business revival. The constructive salvaging work of the Home Owners Loan Corp. in saving defaulted mortgages was brought to an end during the year by exhaustion of its funds. In the low-cost mass housing field, the abandonment of the federal government's efforts to stimulate private limited-dividend companies in favor of a policy of government ownership and operation was a major development. With a budget of about $135,000,000, a plan for 39 low cost "demonstration" housing developments in 33 cities was drawn up; results are listed in the housing article on p. 226. Toward the end of the year, the Housing Act introduced a new objective into the housing picture—the stimulation of private borrowing and lending—but, although by January it had accounted for modernization work estimated at $100,000,000, the stagnation of house building showed few signs of disappearing.

New Trends in Power

● New power development in 1934 was largely concentrated in public operations, notably those of the Tennessee Valley Authority, Boulder Dam, and Bonneville and Grand Coulee on the Columbia River. Interest in the government's program centers chiefly in TVA operations at present because the TVA already is producing power and is attempting to build a market by rates far below rates prevailing heretofore, on the assumption that the resulting increase in power use will make the lower rates profitable. Results obtained so far are encouraging, but it will be a few years before it can be told definitely whether the low rates can be continued without federal subsidy. Rural electrification stands out prominently in the TVA program and is to be included in the new federal construction-and-relief program. Technically the year produced no major developments in the power field.

The prospect of public competition like that of the TVA becoming more general in the near future has led many of the privately owned electric utilities to propose plans for load building which will have the effect of putting rate fixing on a cost-plus-profit basis. Meanwhile the government is going ahead with its plan to determine through the Federal Power Commission what the water power resources of the country are, what rates are being charged throughout the country and what are the costs of transmitting and distributing power.

Progress in the Structural Art

● Reduced opportunity to put new ideas into practice has caused structural engineers to turn to the laboratories and their drawing boards, and some significant developments have resulted. For example, the extent to which the study of models has been embraced, discussed more in detail below, is amazing. Laboratory tests at Wisconsin and Lehigh covered reinforced brick columns; at Lafayette plain concrete columns encased in steel shells were investigated; at Pennsylvania State College and the Forest Products Laboratory the use of plywood for box-girder and gusset-plate use revealed possibilities for a new type of construction.

In California, design studies, legislation and reconstruction have advanced the cause of earthquake-proof construction. Designs based upon the use of dynamic forces, in contrast to previous static assumptions, have been advanced as a result of theoretical reasoning and model studies.

Prospects for building large numbers of grade-separation structures have set engineers to studying new hip-joint details for steel rigid frames in order to eliminate the troublesome radial stiffeners heretofore used. Timber construction, stimulated by the availability of shear ring-dowels, has made notable advance toward prefabrication of trusses and bridge bents. New knowledge of welded seat angles, particularly as regards the importance of tension in so-called shear welds, was reported by the American Bureau of Welding. Slab design for concentrated loads was clarified by a report of the American Society of Civil Engineers' committee on masonry and reinforced concrete, developing some approximate design equations. The society's concrete-arch committee wound up its monumental investigation with the significant conclusion, among others, that the accepted elastic analysis is adequate for open-spandrel arches; deck participation is best avoided.

Turning to actual structures, a few developments may be mentioned. On several New England continuous bridges reactions have been weighed by the use of proving rings such as are utilized to calibrate testing machines. In New York an 80-ft. hemispherical dome was built of concrete 3 in. thick, a new type of construction for this

country. Steel girders of unusually large capacity, provided by utilizing split beams for flanges, were installed in the Pittsburgh post office. A welded steel-channel deck was provided on a Reading R.R. bridge in Pennsylvania.

Model Studies Widely Used

● Structural model analysis has been fostered by the growing popularity of continuous structures and also by the sudden necessity to provide designs for great dams and bridges, for which precedent has not existed. Likewise, the extensive river work of the federal government has given impetus to hydraulic model testing. Some of the more important developments include: increasingly extensive use by highway bridge departments and schools of deformeter gages and celluloid models; the introduction of a new deformeter apparatus causing larger deflections than can be read with a machinist's micrometer instead of a microscope; the perfecting of new photo-elastic apparatus; the testing of an elevated tank model under simulated earthquake loads, resulting in a proposal for an entirely new design procedure for such top-heavy structures; the utilization of a centrifuge as a container in which models may be placed and loaded by a centrifugal force; and the start of a test of a 1/24 size model of a 56-story steel building bent.

The study of river hydraulics by models at the Vicksburg laboratory of the Army Engineers has continued. The roller gate dams for the Mississippi River, and problems connected with lock operations at Tennessee River dams were studied by models at Iowa University. Models were used for design for Grand Coulee and Fort Peck dam spillways.

Knowledge of Materials

● Research in the fields of the major engineering materials runs in cycles. Cement and concrete, stimulated by dam requirements which in turn encouraged a tendency toward new or modified portland cements, have been at the top of the cycle. Brick, too, has received major attention, and the development of de-aired paving brick has furnished a product of increased density and strength. Steel and timber are on the down swing of a cycle, so far as new knowledge for use in construction is concerned, but the wider dissemination of existing knowledge is a fact of special significance, for example in connection with what constitutes suitable structural timber.

In all, cement and concrete occupied the spotlight of 1934. Final results of the Boulder dam research expand knowledge of mass concrete and of low-heat portland cements tremendously. Likewise results made available during the year on the Portland Cement Association's investigation of the effect of cement composition on properties of concrete provide a sound basis for evaluating claims for special cements.

Flood Control

● After 26 years' agitation, Pittsburgh flood control at last was started by aid of PWA funds, contracts being let for the $3,000,000 Tygart River dam to control the Monongahela River. Similarly PWA funds started work on the Muskingum Conservancy District, protecting 8,100 sq. miles of Ohio, where several gate-controlled reservoirs are under construction, and the half completed Lake Okeechobee levee system to protect against wind-blown floods. The San Gabriel Canyon control work of the Los Angeles County Flood Control District is continuing, as is the lower Mississippi flood-control system, where the series of cut-offs was extended during the year and progress was made in working out a bituminous-mat revetment.

Waterways

● Expansion and modernization of inland waterways made notable progress during the year, chiefly as the result of large sums allocated to speeding up the program previously laid down. This includes a large amount of new construction on the upper Mississippi system, further improvements on the Ohio River system, and channel improvements on the lower Missouri. On the Gulf Coast the reconstructed inland waterway from New Orleans to the Sabine River (272 miles) was put into service early in the year. The St. Lawrence waterway treaty, rejected by the Senate in March, now is undergoing what is said to be a minor revision preparatory to resubmission to the Senate.

A notable event in inland waterway development is the recommendation made recently by the National Resources Board that in future the economics of proposed waterways be given more rational consideration than has been customary in the past, and that none be built unless it can be shown that the transport agencies using the waterway can contribute a reasonable share of the cost of construction and operation through the payment of tolls.

The Railroads Step Out

● Taking a tip from the automobile manufacturers, the railroads have gone out to regain some of the lost passenger traffic with "new models" in the form of streamlined high-speed trains of radically new designs. Air-conditioning, first introduced on a considerable scale in 1933, became almost a standard requirement for the better trains by the end of 1934. Closely related to the introduction of the motor-driven trains of light construction is a considerable increase in speed of a few regular trains operated with steam locomotives.

Elimination of grade-crossings between railways and highways continued to go forward during the year at a very much slower rate than is desirable, due chiefly to the inability of the railroads to finance their share of the cost. However, those who saw in crossing elimination work a possible field for worthwhile expenditure of public-works funds over a long period of years continued to recommend such work to those charged with the preparation of public-works programs, with the result that grade-crossing elimination was specially referred to by the President in his message to Congress as a potential source of much constructive employment. Hence it is expected that the President will assign a considerable part of the proposed four-billion-dollar relief fund to that class of work.

Roadbuilding

● Roadbuilding continued to be largely a federal activity. State highway funds, which began to vanish by diversion early in the depression—as soon as it began to be realized that federal dollars could be had to restore the theft—were cut to their lowest volume in 1934. By the Recovery Act of June, 1933, $400,000,000 was

given to the states for roadbuilding, and a year later a further grant of $200,000,000 was made, and at the same time the state debts on the federal loans of 1930 and 1931, amounting to $200,000,000, were cancelled. By the end of 1934, 19,598 miles of road had been completed, 3,181 miles were under construction, and 378 miles had been placed under or approved for contract. This mileage had taken up $385,918,000 of the $400,000,000. Of the $200,000,000 grant of 1934 about $102,000,000 had been allotted for 7,320 miles of road, and about 6,000 miles were completed, under construction or under contract. There remained of this grant slightly less than $100,000,000 to be allotted. In new legislation the Hayden-Cartwright act of June, 1934, takes rank as the most constructive since the federal-aid law of 1921 by restoring regular federal aid and penalizing road tax diversion by states.

Roadbuilding Technique

● Advance in design and in the technique of construction was an outstanding characteristic of highway engineering in 1934. Principles and practices that had been developing in research laboratories and through field experiments reached the stage of being practically applied to large mileages. Listed briefly, these developments were: rational design principles for both rigid and flexible pavements, soil stabilization, vibration of concrete, improved expansion joints, non-skid bituminous surfaces, embankment stabilization (particularly in fills over swamps), checking of frost heaves, use of de-aired brick, machine placing of bituminous surfacing, and better alignment and profile to increase safety and permit roadside development. All these developments advanced well out of the former stage of experimentation to the rank of recognized practice in current road design and construction. Thus a higher technique of roadbuilding was a distinctive contribution of 1934.

Superhighways

● Highway construction of a type exceeding the bounds of the ordinary in cost and traffic service was notably common in 1934. These projects varied in character, from belt and bypass roads to reduce traffic congestion and long detours, to service roads connecting recreational areas. Of the latter the 400-mile highway now being surveyed in the Blue Ridge and the Great Smoky mountains is the outstanding example. For the most part the year's superhighway work has been directed to more practical service of traffic than is the Blue Ridge road. In Connecticut the heavily congested Boston Post Road is being paralleled by a road that will have four 26-ft. pavements and two separating parkways on a 300-ft. right of way; construction began in 1934. Rhode Island is encircling its capital city with a four-lane belt road including a great bridge across Narragansett Bay. Pennsylvania is by-passing Philadelphia with a four-lane road from Delaware to New Jersey. These are but a few of the projects of superhighway character initiated or placed under construction during the year.

Traffic Safety and Control

● Aside from the highly efficient progressive traffic signal system installed last year on Michigan Ave. in Chicago no other important similar traffic-control project has been carried out. Accident reduction campaigns are under way in many cities. Memphis has a model vehicle-inspection system. Important advances have been made toward national standardizing of application of traffic-control means; a Uniform Traffic Code has been published and preparation of a Code on Signs and Markings is well advanced. In addition to the proposed national grade-separation program, to which railway support has come for the first time, there is much activity in the promotion of elevated or depressed thoroughfares. St. Louis and New York are building such structures.

Major Bridge Construction

● Attention of bridge designers and builders has been turned westward by major construction on the Pacific Coast; eleven notable bridges now are being built in the three West coast states. Of two on San Francisco Bay one breaks the world's record for length of span and the other for foundation depths. Both of these passed through their critical foundation stages during the year. A noteworthy accomplishment in the construction of the San Francisco-Oakland bridge was the successful jetting and cleaning of the foundation bed and placement of concrete in open caissons at depths as great as 240 ft. At New Orleans, piers for the new bridge over the Mississippi were sunk to a depth of 170 ft. through artificial sand islands. Current bridge problems deal with longer spans and heavier loads, which suggests higher strength and lighter dead weights as objectives.

Building Progress

● The statistics tell the story of building progress, and it is not very encouraging. Compared to 1933, public buildings increased 70 per cent, industrial buildings decreased 35 per cent, commercial buildings decreased 20 per cent. During the year about one-half of the $135,000,000 provided for federal buildings in some 800 different communities was put under contract. In Washington, the "Triangle" development of departmental buildings was brought to virtual completion so far as present plans go, and new buildings for the departments of War, Interior and Navy were projected for a site known as the "Northwest Rectangle" near the Lincoln Memorial.

PWA funds were used to create something of a boom in school construction in many states. Also some large public buildings such as county court houses, city halls and municipal auditoriums were built with PWA loan-and-grant aid.

In the field of private buildings, a considerable volume of modernization work was accomplished. Reconstruction after the Chicago stockyards fire produced several new buildings, including a large auditorium. Rockefeller Center in New York continued its expansion by adding a 38-story and two 6-story buildings, the outstanding private operation of the year.

Municipal Credit and Finance

● Steady though slow strengthening of municipal credit could be observed throughout the year. The reasons for the improvement were many, but the most important one was that idle capital at last came out of hiding and was eager to go to work. Lending it courage were a number of favorable municipal developments that, super-

ficially at least, promised improved safety to investment. Few, if any, new defaults occurred, and a number inherited from the preceding year were cleared up. Tax delinquencies showed a definite decline, and tax arrears were remarkably reduced. The prevailing rate of interest on municipal securities was from 3 to 3½ per cent when the year closed, contrasting with 4½ per cent or higher at the end of 1933—itself a great improvement over conditions a year or more earlier.

On the other hand, much of the improvement has been more apparent than real. Refunding plans, involving debt scaling and deferred-interest payments in a number of communities, have given a breathing spell to allow rehabilitation. Clearing up of delinquent taxes has been greatly stimulated by the activities of the Home Owners Loan Corporation. Some of the increase in municipal revenues was accomplished by the trick of diverting the reserves of revenue-producing departments. However, net gains in proper financial administration are to be recorded. Budget making has been put on a more realistic basis by the practices of making allowance for uncollected taxes and providing for the previous year's operating deficit. Through the pressure of necessity much surplus baggage in the form of small-district administrative overhead has been discarded.

Outside the bonds sold to the PWA, or those representing the construction expenditures undertaken through PWA help, municipal borrowing has been confined largely to the purpose of refunding of maturing issues, and funding accumulated operating deficit and payments made for unemployment relief.

Deferred Improvements Accumulate

● Despite the improvement in municipal credit and the better terms at which public agencies can market their securities, the steady accumulation of deferred improvements continues. The bulk of new municipal financing during 1934 can be accounted for by funding and refunding operations, which are merely creditor-shifting maneuvers. New construction was confined almost exclusively to those projects undertaken in connection with the public-works agencies of the federal government, and although the volume was considerably greater than that of the preceding year it fell far short of the amount necessary to keep pace with urbanization progress.

Water Supply

● Water supply made distinctly more progress than in the previous year, largely through PWA influence. Many small towns availed themselves of federal financing. The Chicago $22,000,000 filtration project still lags, though 1935 may see the work initiated. Drought conditions last summer accentuated the need for larger storage facilities in many regions of the Middle West and engineers now estimate 50 to 75 per cent more required runoff area than before the last three years' dry-weather records. Some cities with inadequate well supplies have gone to surface reservoirs, as Springfield, Ill., and others with small surface supplies have gone to wells, as Salt Lake City. More attention is now paid to the geology of waterbearing areas.

Technically only refinement in practice is to be recorded. Coatings for pipes are still a vital point and need clarification in specifications. In water purification, better flocculation and provision therefor continued important points. A tendency toward larger sand sizes in filters up to 0.55 mm., will permit increased rates over the long accepted 125-m.g.d. rate. Softening is on the increase and is a fertile field for activity over a wide area of the country.

Stream Pollution

● A steady trend toward urbanization, a rising standard of personal sanitation and continuing development of industry have all conspired, for many years, to bring about a condition of pollution of natural waters that has increased in severity far faster than population has grown. Traditionally, the stream-pollution problem has been considered one purely of local import and the remedy or relief that has been achieved has been largely on that basis. During 1934 for the first time there came a shift in point of view, and it was recognized that the nation as a whole has a stake in maintaining the quality of the flow of streams at as high a point as is feasible. The recent report of the National Resources Board laid stress on quality of river waters. A subsequent interdepartmental conference on stream pollution made an attempt to outline means of abating the evil.

Sewage Disposal

● In the field of sewage treatment the outstanding event of the past year was the making good of the patent rights to the activated-sludge process by Activated Sludge, Inc., claims covering the spiral-flow design of aeration basin, however, were held invalid.

Technical developments continued the rapid pace of recent years. Chemical treatment methods have found recognition as a proper solution of the sewage problem under certain conditions, and have received official approval from a number of communities. Large plants to use chemical precipitation are being planned by New York and by the Minneapolis-St. Paul Sanitary District. The development of mechanical equipment for handling large quantities of sludge and the better understanding of the flocculation and coagulation phenomena have made possible the revival and wide acceptance of a once discredited process.

It is interesting to note how the energy contained in sewage sludge has been put to work in increasing measure. The gas evolved during digestion has been used for some time as gas-engine fuel and used to drive compressors at activated-sludge plants. Plans for New York's new Coney Island plant now call for this energy to be utilized for sewage pumping. Chicago has decided on incineration for ultimate disposal of dewatered sludge, and studies made there hold out the possibility of producing surplus heat that will be available for further energy utilization.

Professional Activities

● Outstanding among developments in the professional field was the organization of the National Society of Professional Engineers to integrate the activities of the state and other local professional societies and to facilitate their joint action on matters of a national nature. Since the society took definite form in May, six state societies have voted to affiliate with it. Licensing made no gain during the year in the number of states having license laws.

Economic and Business Changes

TRACING THE progress of recovery through successive ups and downs, the observer finds that a foundation has been laid for continuing and possibly accelerated advance - - - Natural forces and government help have taken out weak spots - - - Reopening of capital markets probable

DAVID DILLMAN
Economist, The Business Week, New York, N. Y.

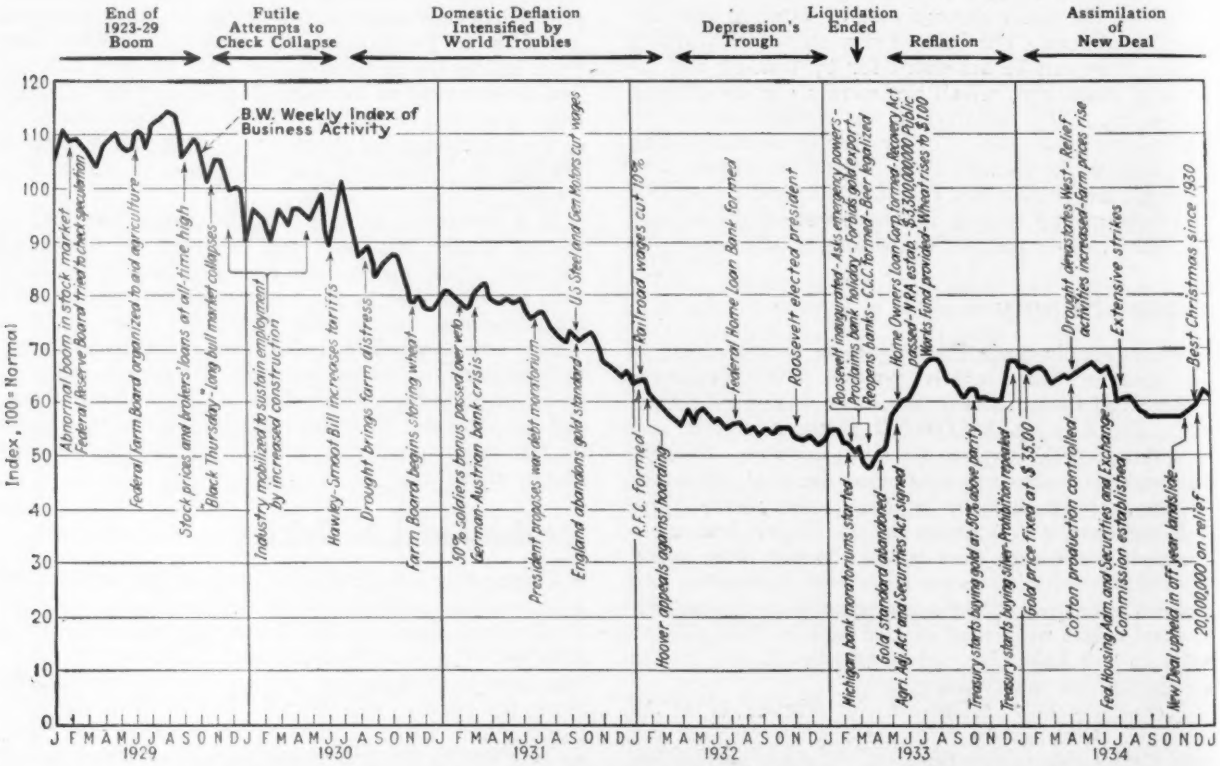
● What is going on in business has much to do with the prospects of engineering and construction, integral parts of the general economic machine. The present survey of business events and trends, therefore, provides a background on which to project the picture of construction progress and the outline of current problems that follows in later pages.
—Editor

A YOUNG business rally, already three months old, ushered in 1935. It began when activity in most lines turned up hesitantly with late summer, then drifted indecisively through the fall months and finally spurted in early winter. But for all this recovery, business barely retraced the ground lost in last summer's slump. Thus, we start 1935 about on a par with 1934.

Forces of current revival

It is the consumption lines that still furnish the mainstay of industry and business. The latest rallying impetus came mainly from four causes—the lift of 25 per cent in Christmas buying, the miscellaneous construction activity bred by the Federal Housing Administration's modernization program, the demand for automobiles, and sales of electrical appliances. Farm buying and building helped.

There is substance behind this improvement, lopsided as it is. There are the 27 per cent larger factory payrolls, the $260 millions extra and increased corporate dividends of the last six months, the billion more of farm income, and the government's provision for the 20 million persons on relief. It has lifted factory production back to 85 per cent of normal, the level from which it fell last summer, a gain from the 70 per cent bottom in September's low point, comparing with 76 per cent a year ago. Factory output currently moving into consumption is enough to hold railroad carloadings above 90,000 daily or within 15,000 of the average at this season during the last five years; last fall traffic was 30,000 cars short of such an average. Demand for electrical power is running 150,000,000 kw.-hr. weekly ahead of last year, whereas last fall it barely equalled the prior year's requirements. Over-all cash value of business turnover, best measured by check payments, is $600,000,000 a week


End of 1923-29 Boom
Futile Attempts to Check Collapse
Domestic Deflation Intensified by World Troubles
Depression's Trough
Liquidation Ended
Reflation
Assimilation of New Deal
B.W. Weekly Index of Business Activity
Index, 100 = Normal
Abnormal boom in stock market - Federal Reserve Board tried to check speculation
Federal Farm Board organized to aid agriculture
Stock prices and brokers' loans at all-time high
"Black Thursday" - long bull market collapses
Industry mobilized to sustain employment by increased construction
Hawley-Smoot Bill increases tariffs
Drought brings farm distress
Farm Board begins storing wheat
30% soldiers bonus passed over veto
German-Austrian bank crisis
President proposes war debt moratorium
England abandons gold standard
U.S. Steel and Gen Motors cut wages
R.F.C. formed
Railroad wages cut 10%
Hoover appeals against hoarding
Federal Home Loan Bank formed
Roosevelt elected president
Roosevelt inaugurated - Asks emergency powers - Proclaims bank holiday - Forbids gold export - Reopens banks - C.C.C. formed - Beer legalized
Home Owners Loan Corp. formed - Recovery Act passed - N.R.A. estab. - $3,300,000,000 Public Works fund provided - Wheat rises to $1.00
Michigan bank moratoriums started
Gold standard abandoned
Agri. Adj. Act and Securities Act signed
Treasury starts buying gold at 60% above parity
Treasury starts buying silver - Prohibition repealed
Gold price fixed at $ 35.00
Drought devastates West - Relief activities increased - Farm prices rise
Extensive strikes
Cotton production controlled
Fed. Housing Adm. and Securities and Exchange Commission established
New Deal upheld in off-year landslide
20,000,000 on relief
Best Christmas since 1930
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J
1929
1930
1931
1932
1933
1934

THE BUSINESS CURVE slants gently upward as 1935 opens, after last year's reaction. Its rise reflects recovery of confidence, expressed in stability of money and survival of economic institutions, and the sustaining force of consumption.

greater than a year ago, though only $230,000,000 more after allowing for the year's price increases. Similarly adjusted, the cash volume last fall was less than that of a year before.

The midyear slump

Business had worked into an unhealthy situation in 1933's summer "inflation" boom. Beating the gun in expectation of higher material and labor costs had piled shelves too heavily with many commodities that proved sticky when NRA's promise of greater buying power to workmen was slow in materializing. When 1934 opened, markdowns here and there met slowly improving industrial payrolls, and goods again moved in fair volume; yet in some lines, textiles for example, most of the year 1934 was devoted to clearing up stocks that had been piled up in that initial spurt. In others, especially steel, operations were still being sustained by buying against a scheduled price rise.

Practical suspension of operations in those two lines by the middle of 1934 produced the recession of the summer months. On top of the shutdowns came the strikes, uncertainties over the government's ability to finance its ambitious spending program, dissipation of any hopes for foreign trade revival, and on top of all the drought scare. The accumulation of bad news was enough to set business sentiment back.

The nervousness of the banking world communicated itself to business. But the public, only partly conscious of business and financial downheartedness, continued to spend and ate away at inventories of everyday necessities.

Retailers and wholesalers came back into the markets repeatedly to replenish stocks. Their reorders gave manufacturing a steady if modest backlog. Also, the drought proved a disguised blessing to farmers, causing an advance of 30 per cent in farm prices combined with $600,000,000 of benefit payments. Farm buying became an important contribution to recovery. The national income, $52 billions, increased 11 per cent from 1933.

Present factors

The fact that it required most of the year to get back to realities looms large in the 1935 outlook. Expectations for the year will be modest.

Business still fears Washington and labor. The unions were not able to capitalize Sec. 7-a of the Recovery Act to the extent anticipated, and the fruitless violence of last year's strikes should exert a sobering influence on labor leaders. But disputes continue to be vexing and monopolize attention that could better be devoted to constructive planning. The arbitration machinery set up to deal with labor problems has not demonstrated its effectiveness.

Both Washington and business interests have been clumsy in their mutual relations, to the point of retarding general economic progress. The most constructive thing for the new year would be a cultivation of the friendlier, less suspicious attitude developed in the last three months. Unfortunately, other things intervene. The Administration finds itself on the defensive in the Supreme Court and in legislative halls. In the courts it must justify what has been done. In Congress it must guard against having its activities either circumscribed or elaborated overmuch. It also feels impelled to add to its experimentation a program of social insurance, and to extend its scope of influence by bringing the electrical-power industry under its sway. These developments tend to cause new disquietude in the more reactionary business circles.

Public expenditure and debt

Beyond this the New Deal will presumably carry on about as heretofore, except for such modifications as are forced upon it by the Supreme Court or Congress. It has the virtue of familiarity; it has lost much of its alarming characteristics to businessmen whose fears arose mainly from inability to grasp the vastness of the many new governmental agencies.

One other innovation, however, is the change in relief administration policies. Contrary to the expressed preference of the spokesmen for private interests, the President has adopted work-relief in lieu of a straight dole, or a combination of the two such as has been used up to date. With the die so cast, it is well to calculate the costs, for therein lies the nearest answer to what we may look for.

The construction program is expected to cost four billion dollars to June 30, 1936, and the government's deficit for the year will approximate the same figure, elevating the national debt to more than $32 billions. Such appropriations of themselves need not impair the government's financial position. Service on the present debt is 1.5 billion dollars annually, including $640,000,000 for yearly retirements. Interest on each additional billion adds less than $30,000,000 to the yearly tax bill. The procedure of issuing securities—largely to banks, where they create still more bond-buying power—can accommodate the needs of government far beyond any presently contemplated indebtedness without strain.

Any immediate hazard, therefore, to monetary stability lies outside the Administration program. Such hazard, which is latent in the "money clique" and in the logrollers of Congress, need never materialize if public sentiment remains sound and alert.

The outlook

Foundations of progress are much firmer for what has taken place in the

A Page From the National Ledger

1934 DEBITS		CREDITS	1934
Federal deficit	$4,063,000,000	**Barometer Items**	
Less assets acquired	756,000,000		
	$3,307,000,000	Steel tonnage	Up 12%
		Construction	Up 27%
Relief rolls	Up 33%	Railroad freight traffic	Up 5.4%
Relief costs	Up 85%	Electrical power used	Up 7%
		Check payments	Up 8%
		Purchasing Power	
		National income (est.)	Up 11%
		Farm income	Up 23%
		Factory employment	Up 14%
		Factory payrolls	Up 27%
		Industry and Commerce	
		Textile production	Up 10%
		Automobile production	Up 36%
		Department store sales	Up 13%
		Financial	
		Bank Deposits	Up 21%
		Life insurance sales	Up 10%
		Corporation dividends	Up 12%
		Number of failures	Off 45%
		Liabilities in failures	Off 51%
		Price Level	
		Wholesale commodities	Up 14%
		Bond prices	Up 39%
		Stock prices	Up 14%

last two years. Time, natural forces, government help, have taken out most of the weak spots that existed at the advent of the New Deal. Liquidation of credit, real estate, securities and commodities no longer hangs over the markets. Corporations have had two years of better earnings. Banks and insurance companies, threatened with certain insolvency two years ago, are rebuilt to sound conditions. The price structure and the financial machinery have adjusted themselves satisfactorily to the gold-price changes.

The country's credit base has been augmented by $1.2 billion of gold over and above the initial increment to value of the monetary reserve through the price mark-up. Commercial banks have excess reserves of $2.2 billions, the potential source of $20 billions additional credit for any business demands that arise.

Finally, the long-awaited reopening of the capital markets seems at hand. Investment demand has been active for the last year, but the machinery for bringing out new securities to satisfy it has been stalled by cumbersome regulations, now removed. What funds business can use, for either long or short-term purposes, are offered at such attractive rates that the urge to borrow and expand will become contagious as soon as the profit possibilities become clearer.

Recovery Measured by Men at Work

A SURVEY of employment facts in factories and construction shows definite progress in dealing with a fundamental evil of the depression, but durable-goods industries still lag far behind, while many industries that make consumption goods have exceeded even their pre-depression years.

BY ISADOR LUBIN

Commissioner of Labor Statistics, U. S. Dept. of Labor, Washington, D. C.

● As the most significant measure of depression and recovery, the volume of unemployment and wage payments has fundamental importance for engineering construction, since the demand for improvements grows out of activity of industry and the prosperity represented by the workers' wage income.

A BROAD TEST of the effectiveness of the recovery program is afforded by the statistics of employment and payrolls in the manufacturing and construction industries. Although the course followed by these barometers since March, 1933, has been altered from time to time by powerful counter-currents, the trend has been definitely upward, and the net gains have been substantial.

Building and construction

Compared with most branches of industry, however, building construction has been slow to respond to the recovery measures. Throughout 1933 building operations remained at extremely low levels, in spite of the important forward strides made in other directions. In 1934, at last the vigorous efforts of the Federal Housing Administration and other government agencies loosened the grip of the depression, and total construction for the year as a whole will show a modest increase over 1933. This is especially significant as it is the first year since 1925 that building operations, as indicated by building permits, have shown an increase over the year preceding. The increase in 1934 was largely the result of a campaign to stimulate repairs, the increase in this class of work over 1933 being nearly 30 per cent.

This increased activity is clearly reflected in employment and payroll statistics. In November, 1934, the latest month for which figures are available, employment in private and public building construction not aided by PWA funds was 32.4 per cent higher than in March, 1933, the low point of the depression. During the same period payrolls increased 38.9 per cent. These figures are based on reports from over 10,000 firms in various localities in 34 states and the District of Columbia.

In addition to the increased employment resulting from the moderate recovery of private construction, large numbers of workers have been provided with jobs on public-works construction projects. Since the start of the public-works program nearly $320,000,000 has been disbursed for payrolls, and when this work was at its peak more than 650,000 workers were directly employed on the projects.

FACTORY employment and payrolls have been much more responsive to the recovery program than has construction.

Material orders valued at $612,000,000 have provided jobs for numbers of other workers indirectly. For example, about $90,000,000 has been spent for cement, over $104,000,000 for steel and rolling-mill products, and more than $65,000,000 for foundry and machine-shop products.

In seven of the major industries manufacturing construction materials, employment in November, 1934, was about 45 per cent greater than in March, 1933. These industries are brick, tile and terra cotta, steam and hot-water heating apparatus and steam fittings, structural and ornamental metal work, lumber sawmills, lumber millwork, cement, and plumbers' supplies.

Factory jobs and payrolls

Manufacturing has been much more responsive to the recovery program than the construction industry. In the black month of March, 1933, basic industrial activity slowed down to almost a standstill as the result of the financial crisis that culminated in the nation-wide bank holiday. For that month the Bureau of Labor Statistics index of factory employment (based on the three-year average 1923-24-25 as 100) stood at 58.8, the low point of the depression. But with confidence restored after the reopening of the sound banks, the country witnessed one of the most spectacular examples of

TABLE I—EMPLOYMENT AND PAYROLLS IN THE DURABLE AND NON-DURABLE-GOODS INDUSTRIES

Group	Employment			Weekly Payroll		
	Average 1923–25	March 1933	November 1934	Average 1923–25	March 1933	November 1934
Durable	4,334,000	1,901,500	2,696,000	$113,825,000	$28,795,000	$52,478,000
Non-durable	4,045,000	3,022,900	3,739,000	89,543,000	46,637,000	68,607,000

TABLE II—EXTENT OF RECOVERY IN EACH BRANCH OF THE DURABLE AND NON-DURABLE-GOODS INDUSTRIES

Industry Group	Employment			Weekly Payroll		
	Average 1923–25	March 1933	November 1934	Average 1923–25	March 1933	November 1934
Durable Group						
Iron and steel and their products, not including machinery	859,100	401,700	568,700	$24,658,000	$5,604,000	$10,899,000
Machinery, not including transportation equipment	878,100	413,500	684,000	23,655,000	6,195,000	13,531,000
Transportation equipment	563,500	254,900	350,500	17,214,000	4,789,000	8,332,000
Railroad repair shops	482,100	244,100	248,800	13,563,000	5,160,000	6,022,000
Non-ferrous metals and their products	282,600	143,500	214,800	7,329,000	2,132,000	4,309,000
Lumber and allied products	918,400	314,600	446,300	18,523,000	3,035,000	6,224,000
Stone, clay and glass products	350,300	129,100	182,900	8,878,000	1,881,000	3,161,000
Non-Durable Group						
Textiles and their products	1,629,400	1,238,300	1,481,100	31,676,000	14,318,000	22,522,000
Leather and its manufactures	323,500	259,200	264,000	6,986,000	3,712,000	4,261,000
Food and kindred products	668,300	514,800	728,800	15,240,000	9,272,000	14,651,000
Tobacco manufactures	138,400	73,700	88,600	2,225,000	742,000	1,086,000
Paper and printing	531,100	425,200	515,200	14,865,000	9,379,000	12,308,000
Chemicals and allied products, and petroleum refining	333,000	282,600	361,800	8,321,000	5,434,000	7,565,000
Rubber products	134,300	80,400	102,900	3,468,000	1,128,000	1,998,000

industrial recovery in our economic history.

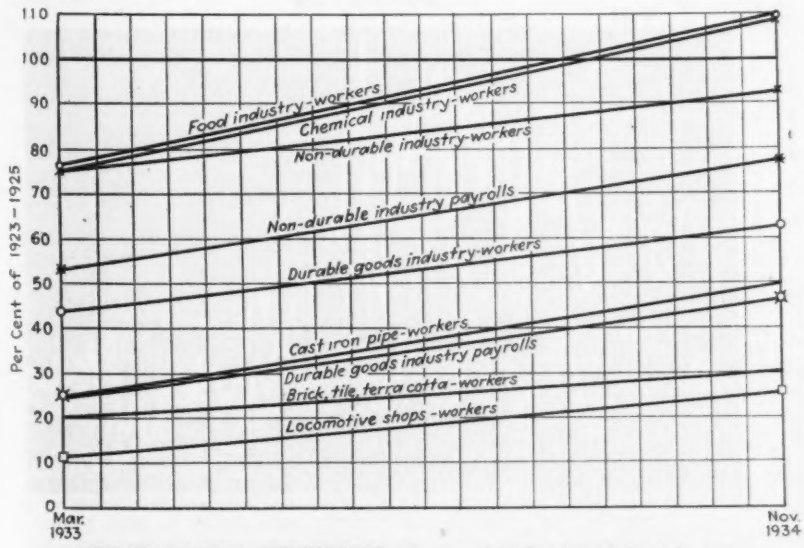
In the short space of four months, March to July, the rate of industrial activity increased 60 per cent. By July employment had reached that of November, 1931, and factory payrolls were higher than for any month since March, 1932. Speculation in inventories in anticipation of the price advances that were a necessary part of the recovery program accounted for a portion of revival, and, in consequence, a reaction set in.

But the indexes of factory employment and payrolls continued to advance as a result of the rapid adoption of codes of fair competition, and factory employment reached the highest level of the year in September (index, 80.0), while payrolls reached their peak a month later (index, 59.4). As a result, in spite of the seasonal contraction in the latter part of the year, 1,300,000 more factory workers were employed in December, 1933, than in March, and weekly payrolls gained $35,000,000.

In 1934 an industrial upswing that began in February brought the index of factory employment to 82.4 in May, the highest point recorded in 3½ years. Employment receded during June and July, and more in September, but settlement of the textile strike was reflected in pronounced gains in employment and payrolls in October. November, the latest month for which information is available, showed a seasonal decline. The employment index for that month was 76.8, and the payroll index was 59.5—gains of 30.6 and 60.4 per cent respectively over March, 1933. In the 21-month interval 1,500,000 wage-earners had been re-employed in the factories, and payrolls increased by nearly $46,000,000 per week.

The depression has not been felt by all branches of manufacturing in the same degree. Table I shows the durable-goods group has shrunk to much lower levels than the non-durable group. In March, 1933, employment in the durable-goods group was 56.9 per cent below the 1923-25 average, and payrolls had decreased 74.7 per cent. Although 800,000 workers have been returned to employment in the durable-goods industries up to November, 1934, the level of employment is still low; continued dullness in building construction is probably the largest single factor in the present situation.

In the non-durable-goods group, employment in March, 1933, had gone down only to 74.7 per cent of normal, and payrolls to 52.1 per cent. Since then, a gain of 716,000 workers and $21,970,000 in weekly wages has been made.



DURABLE-GOODS INDUSTRIES have consistently lagged behind non-durable-goods industries in employment and payrolls. Note that foods and chemicals, in November, 1934, had employment higher than their 1923-25 average.

Durable goods low

In every instance, employment in each of the durable-goods groups of industries had fallen to a much lower level in March, 1933, than in the non-durable-goods group. The lumber and the stone, clay and glass-products groups were most seriously affected by the depression. The chemicals group, on the other hand, did not fall below 85 per cent employment.

Certain individual industries suffered more than their industry groups during the depression. Thus, in March, 1933, locomotive shops were down to 11 per cent employment, cast-iron plants to 26 per cent, car-building shops to 22 per cent, sawmills to 21 per cent, and brick, tile and terra cotta plants to 20 per cent.

Since then, all these industries have made good percentage gains (respectively, 229, 89. 45, 53 and 53 per cent. Yet employment in these industries still remains at an extremely low level compared to normal.

On the other hand, many of the non-durable-goods industries have reached a level of employment above normal. November, 1934, employment was nearly up to normal in the cotton-goods industry and above normal in the slaughtering and meat-packing industry, as well as in baking, beverages, knit goods, women's clothing, men's furnishings, shirts and collars, paper and pulp, chemicals, druggists' preparations, petroleum refining, soap, rubber goods, wirework, cash registers and typewriters.

There is still much progress to be made in securing a more normal balance of industry. Stimuli are particularly needed in the heavy industries. Increased activity in building construction would materially aid their revival.

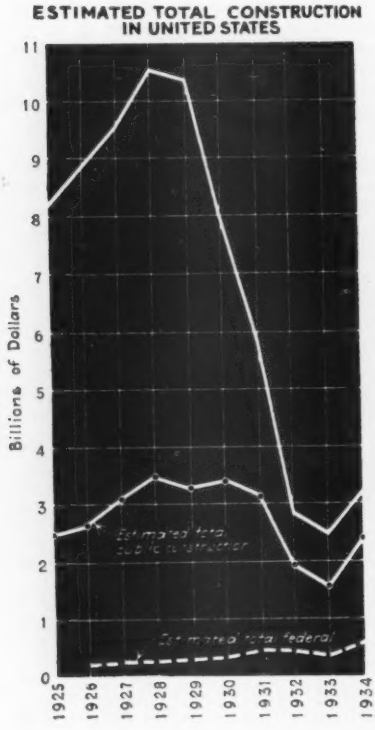
Construction Facts and Outlook

PUBLIC WORKS brought the total of 1934 construction to 3.1 billion dollars, a gain of 27 per cent over 1933, but private construction dropped to new low level • • • Costs rose because of increase in materials prices and labor rate • • • 1935 volume estimated to reach 4 billions.

FUNDS provided by the federal government in the form of loans, grants and direct appropriations poured forth in sufficient quantity, beginning late in 1933, to lift 1934 construction operations to a three-year high, and to reverse the precipitous downward trend in construction activity that has prevailed since the peak of 1928. Estimates place the total of all construction in 1934 at $3,104,000,000, a 27 per cent increase over the previous year's volume, verifying the prediction made a year ago. Yet it was only 29 per cent of the construction activity in 1928, the peak year.

Public works alone are responsible for this gain, for private engineering construction dropped to 73 per cent of that of 1933, and residential building remained at a low level, bringing all private work to a new low of $731,000,000, a loss of 19 per cent from the previous year. Private work, which in normal times constitutes two-thirds of all construction, now is only 24 per cent of the total.

FIG. 1—CONSTRUCTION shows an increase in volume for the first time in six years. Federal projects and federal financing of state and municipal work were responsible for the rise.



Public works over two billions

Federal construction in 1934, including both contracts and force-account operations, was the greatest in the peace-time history of the country, exceeded only by the tremendous war volume of 1918. Federal projects were far-flung, from the Columbia and Missouri River dams in the Northwest and the All-American Canal in California, through the Mississippi and lower Missouri River flood-protection and navigation-improvements works, to the South with its extensive TVA operations and the Lake Okeechobee work in Florida. It is estimated the federal construction (not including highway work) amounted to $563,000,000, an increase of 66 per cent over 1933.

State and municipal construction is estimated at 1.8 billion dollars, a 52 per cent gain over 1933. PWA financing

TABLE I — ESTIMATED DOLLAR VALUE OF ALL CONSTRUCTION IN UNITED STATES
(Millions of Dollars)

	Residential	Public Works	Other	Total	ENR Cost Index
1919.....	1,160	1,640	740	3,540	198.42
1920.....	706	1,470	1,204	3,380	251.28
1921.....	1,100	1,510	860	3,470	201.81
1922.....	1,675	1,780	1,445	4,900	174.75
1923.....	1,980	2,300	1,590	5,870	214.07
1924.....	2,120	2,500	1,610	6,230	215.36
1925.....	2,704	2,476	2,998	8,178	206.68
1926.....	2,676	2,670	3,532	8,878	208.03
1927.....	2,544	3,073	3,978	9,595	206.24
1928.....	2,796	3,480	4,304	10,580	206.78
1929.....	1,934	3,263	5,180	10,377	207.02
1930.....	1,103	3,363	3,592	8,058	202.85
1931.....	812	3,098	2,020	5,930	181.35
1932.....	281	1,918	640	2,839	156.97
1933.....	249	1,533	658	2,440	170.28
1934.....	249	2,373	482	3,104	198.10

TABLE II — ESTIMATED VALUE OF ALL CONSTRUCTION BASED ON 1913 COSTS
(Millions of Dollars)

	Residential	Public Works	Other	Total	ENR Volume Index
1919.....	585	825	373	1,783	98
1920.....	281	586	480	1,347	99
1921.....	547	750	427	1,724	96
1922.....	960	1,020	830	2,800	147
1923.....	925	1,072	743	2,740	146
1924.....	987	1,160	743	2,890	154
1925.....	1,314	1,203	1,454	3,971	201
1926.....	1,286	1,280	1,745	4,311	228
1927.....	1,246	1,496	1,933	4,675	263
1928.....	1,351	1,691	2,080	5,122	287
1929.....	935	1,575	2,496	5,006	317
1930.....	544	1,654	1,770	3,968	260
1931.....	448	1,705	1,114	3,267	220
1932.....	179	1,222	408	1,799	127
1933.....	146	900	386	1,432	102
1934.....	126	1,197	243	1,566	114

ENGINEERING CONSTRUCTION CONTRACTS-AVERAGE WEEK PER MONTH AS REPORTED BY E.N.-R.

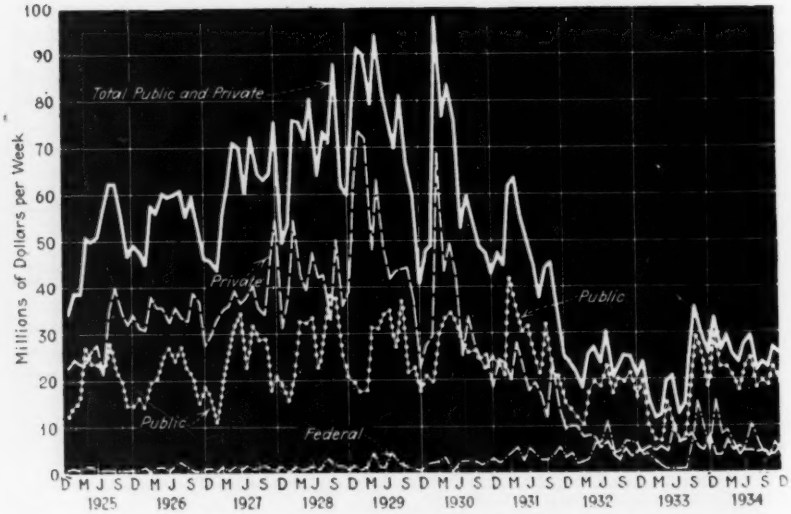


FIG. 2—AVERAGE WEEKLY CONTRACT AWARDS were steadier and higher than in 1933. Private work averaged only $5,000,000 per week for the year, a long-time low.

TABLE III—ENGINEERING CONSTRUCTION CONTRACTS REPORTED BY ENR IN 1934

(Thousands of Dollars)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States 1934	United States 1933	Canada 1934	Canada 1933
Public Works										
Waterworks	6,739	7,624	4,834	13,998	12,773	46,527	92,495	67,263	1,210	3,731
Sewerage	7,267	13,288	5,371	20,698	11,643	2,801	61,068	22,175	1,436	2,173
Bridges, public	10,003	14,520	7,222	15,803	28,038	13,214	88,800	80,890	5,597	5,070
Earthwork and waterways	3,937	6,820	86,074	17,759	79,981	71,860	266,431	136,575	2,635	482
Streets and roads	21,619	57,275	62,249	69,952	91,440	42,531	345,066	288,258	11,834	9,186
Buildings, public	23,595	78,471	20,607	20,022	44,279	17,211	204,185	121,161	10,463	1,905
Unclassified, public	2,239	25,861	4,311	3,182	12,177	13,518	61,288	22,817	3,768	1,385
Total public	75,399	203,859	190,668	161,414	280,331	207,662	1,119,333	739,139	36,943	23,932
Federal gov't. (included in above classifications)	9,018	38,426	100,931	23,233	104,492	84,066	360,166	217,180	.....	.....
Private										
Bridges, private	25	4,257	3,561	1,539	644	18	10,044	16,941	.....	.....
Buildings, industrial	9,210	18,070	12,319	46,366	7,735	11,492	105,192	152,376	7,499	7,488
Buildings, commercial	12,719	41,222	2,677	10,471	5,862	7,734	80,685	106,399	2,541	3,321
Unclassified, private	3,079	6,148	5,578	6,781	15,753	8,003	45,342	53,514	944	665
Total private	25,033	69,697	24,135	65,157	29,994	27,247	241,263	329,230	10,984	11,474
Total — 1934	100,432	273,556	214,803	226,571	310,325	234,909	1,360,596	.....	47,927	.....
Total — 1933	58,594	298,481	123,988	150,693	225,295	211,318	.....	1,068,369	.....	35,406

was responsible for most of this, though revival of the municipal bond market reached unexpected proportions and led to construction issues of some $385,000,000. Street and road construction (including the federally financed highways) was the largest item, 30 per cent of the total; flood control, irrigation and river improvements were next, amounting to 24 per cent of all state and municipal work.

Private work at new low

Private engineering construction last year dipped to the lowest point in our 21 years of record, and is estimated at only $482,000,000; about 10 per cent of the peak-year total of 1929 and 73 per cent of the 1934 figure. Industrial building work suffered the greatest loss in volume, dropping to two-thirds of the previous year's figure. Commercial buildings fell off by 25 per cent, to the almost insignificant figure of 4.8 per cent of their 1929 value. Of small consolation to the demoralized building contracting fraternity is a 67 per cent increase in public building contracts for the year, though this gain, large in percentage but small in volume, is buried in the downward rush of private building.

Building permits and residential construction showed little change in 1934 as compared with 1933. Permits registered a slight gain, 2 per cent, but the residential volume remained stationary —only 9.2 per cent of the volume reached in 1928, which was the peak year of home building.

The volume of total and various classes of construction for the past decade is shown in Tables I, II and III and in the charts in Fig. 1 to 6. These are indicated totals, based on contract awards and permits reported.

Municipal bonds rise sharply

While federal financing again predominated in the new capital total, state and municipal bond markets staged a spectacular comeback. The year closed with an increase in new capital from the private investment market and a decline in new capital from PWA and RFC. The total of new capital in 1934 dropped 33 per cent below the

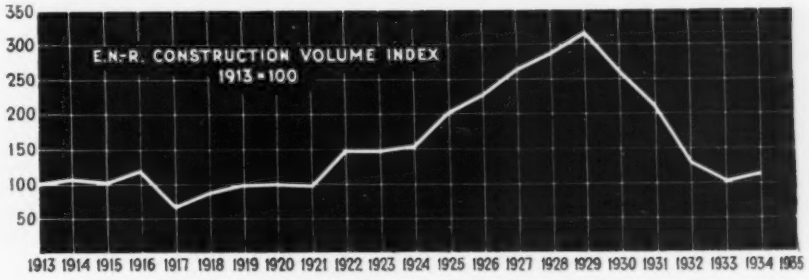
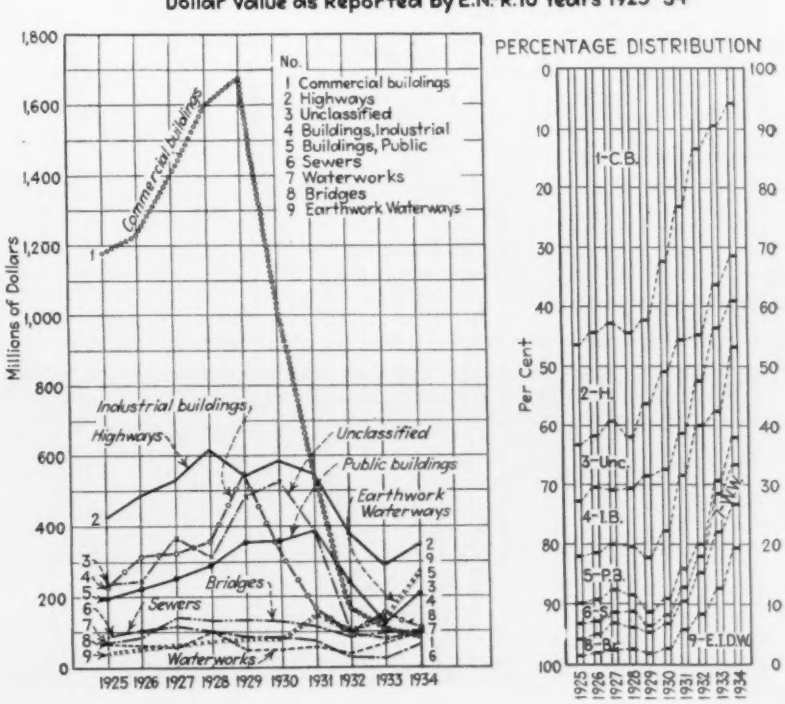


FIG. 3—PHYSICAL VOLUME of construction, based on 1913 costs, over the past 22 years is shown by the volume index.

1933 total, due to the decline in PWA allotments outstanding (Fig. 7).

Municipal bond sales for all purposes reached the total of $942,000,000, of which $385,000,000 was for new construction, the rest being for refunding, relief, operating and other purposes. The increase over 1933 of new construction issues was 39 per cent. Federal loans for state and municipal con-

FIG. 4—PRIVATE COMMERCIAL AND INDUSTRIAL buildings were the only two classifications of construction that failed to show a gain in 1934. Commercial buildings, once the mainstay of construction, have fallen from a tremendous volume in 1929 to an almost insignificant amount in 1934.



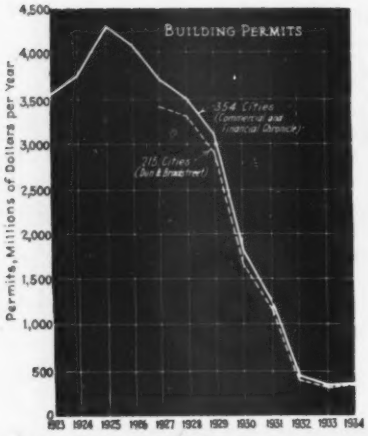


Fig. 5—BUILDING PERMITS for 1934 were as disappointing as for the previous year, showing only a very slight gain. Permits in 215 of the largest cities account for a large percentage of the country's total.

struction declined from $814,000,000 in 1933 to $580,000,000 in 1934 or 40 per cent. Included in this 1934 total is $200,000,000 for state highway work made available under the provisions of the Hayden-Cartwright Bill.

Corporate issues for new construction were negligible from both private investment sources and federal loans. The former totaled $22,000,000 for 1934, and the latter $55,000,000, compared with $55,000,000 and $237,000,000 in 1933. The dearth of financing for private construction is reflected in the low volume of private construction awards reported for 1934.

The state and municipal bond market was so strong that the Public Works Administration resold during the year, through the Reconstruction Finance Corp., six blocks of its bond purchases, involving a total transfer from federal to private financing of $29,000,000.

The strong municipal bond market carried over into 1935. In summing up 1934 bond sales the *Commercial and Financial Chronicle* states, "The market for state and municipal bonds during 1934 was exceptionally good, not only in regard to the volume of issues sold, but also with respect to the extremely low interest rates carried on the bonds placed by borrowers. Municipal bonds sold at higher prices in 1934 than in any year since 1901."

In Table IV, covering new financing, the federal financing figures are not directly comparable to the bond sales that make up the private-investment section, as the federal figures represent allotments rather than bond sales, and a lag exists between the allotment and the bond purchase. Also there is a small turnover, allotments to certain municipalities being rescinded and re-allotted to other applicants. The PWA total represents allotments outstanding.

PWA allotments of $194,000,000 for federal work were made during the year, adding to the total of public and private financing.

TABLE IV — CORPORATE, STATE AND MUNICIPAL FINANCING

(Millions of Dollars)

	Total Financing Incl. Refunding*			New Productive Capital		
	Corporate	State and Mun.	Total	Corporate	State and Mun.	Total
1925	$4,222	$1,400	$5,622	$1,966	$1,352	$3,318
1926	4,574	1,365	5,939	1,824	1,344	3,168
1927	6,507	1,510	8,017	1,784	1,475	3,259
1928	6,930	1,425	8,345	1,568	1,379	2,947
1929	9,376	1,431	10,807	1,758	1,418	3,176
1930	4,757	1,487	6,244	2,032	1,434	3,466
1931	2,371	1,256	3,627	787	1,235	2,022
1932	643	849	1,484	159	561	720
1933	380	520	900§	292†	1,091‡	1,383
1934	490	942	1,432§	77†	965§	1,042

*From Commercial and Financial Chronicle.
§PWA Financing not included.
†Includes $237,000,000 PWA loans, '33; $55,000,000, '34.
‡Includes $814,000,000 PWA loans and grants, '33; $580,000,000, '34.

TABLE V—RELATIVE PRICES

	1934 Prices Based on 1913 = 100	1934 Prices Based on 1926 = 100	1926 Prices Based on 1913 = 100
Labor	279	97	288
Lumber	206	95	218
Cement	166	93	178
Steel	119	91	131
ENR Cost Index	**198**	**95**	**208**

Employment and wages rise

Labor conditions in the construction field showed some improvement over the previous year. Hourly wage rates, both skilled and common average for twenty cities, registered increases. This trend in construction wages followed similar trends in manufacturing fields (Fig. 9).

Employment in construction reached a three-year peak in the early summer of 1934, but tapered off during the fall months. Direct employment on state and federal highways, including maintenance, reached a peak of 550,000 in June, but dropped to 320,000 by November (Fig. 8).

Construction costs rise

Construction materials prices in general moved upward during 1934 but through a much more narrow range than during the sharp increases of 1933.

FIG. 6—THE GEOGRAPHICAL DISTRIBUTION of construction contracts shows the West and South gaining at the expense of the East and New England.

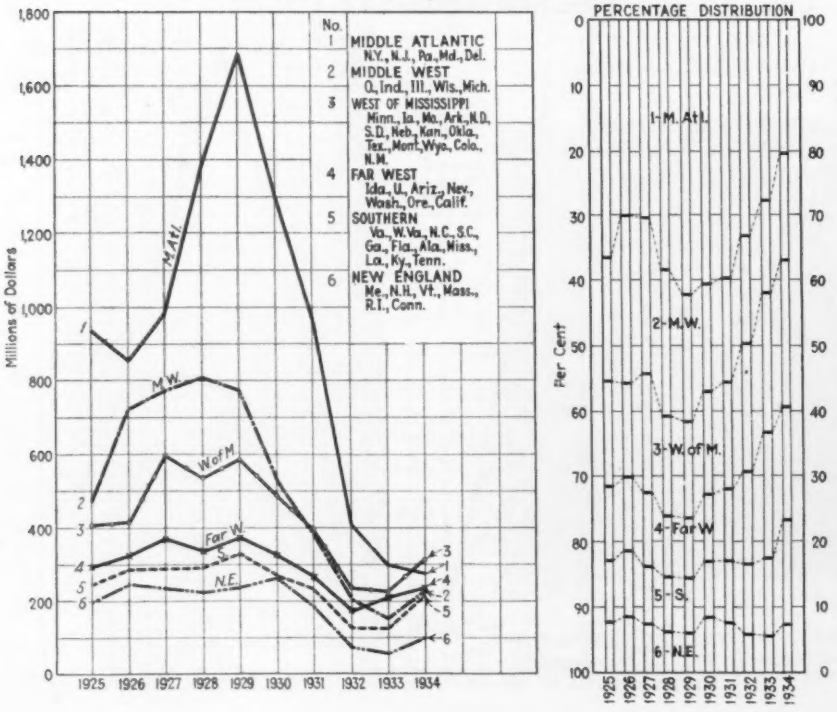


FIG. 7—NEW PRODUCTIVE capital issued during 1934 fell below that of 1933 because of a drop in PWA allotments. Capital supplied by private interests actually showed a gain for the year, the first since 1930.

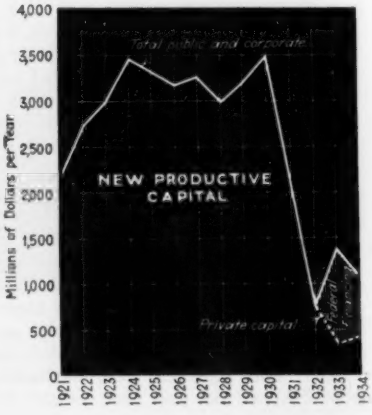


TABLE VI — OUTPUT OF VARIOUS CONSTRUCTION MATERIALS FOR TEN-YEAR PERIOD

	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1934 to 1933 Per Cent
Lumber production, millions bd.-ft.	38,339	36,936	34,532	34,142	36,886	26,051	16,523	10,159	13,961	15,500*	111
Cement shipments, thous. bbl.	156,720	161,784	170,928	175,452	169,440	159,558	126,465	80,529	64,086	75,917	118
Steel-ingot production, thous. tons	44,141	46,936	43,777	50,325	54,850	39,595	25,193	13,323	22,594	25,260	113
Fabricated structural-steel shipments, thous. tons	2,998	3,218	2,854	3,122	3,307	2,987	1,812	942	898	1,116	124
Fabricated steel plate, new orders, thous. tons	389	516	500	628	639	569	303	162	198	232*	117
Explosives, new orders, thous. lb.	481,152	513,876	477,324	455,184	484,596	424,920	325,440	227,508	249,366	307,834*	123
Sand lime brick, shipments, thous.	.....	.....	205,080	205,320	172,644	102,552	64,500	27,003	12,427	11,170*	90
Face brick, aver. per plant, thous. shipments	13,284	13,512	13,200	12,948	11,964	8,496	5,388	2,303	1,791	2,000*	112
Prepared roofing, shipments, thous. squares	.....	.....	.....	36,540	39,864	27,876	22,592	22,208	23,883	23,870*	100

*Preliminary figures.

Price movements were mixed, particularly in lumber and in the materials controlled by local conditions, such as the aggregates and the clay products. Construction materials continue much lower relatively than labor, but higher than consumer commodities such as food and textiles.

The *ENR* Cost Index increased from a 1933 average of 170.18 to a 1934 average of 198.10 on a 1913 base. The corresponding price index for labor is 279, for lumber 206, for cement 166, and for steel 119. The relation of these prices depends materially on whether they are compared with a 1913 or a 1926 base, as shown in Table V.

Compared with the general commodity index, which will average about 75 (1926 base) for 1934, the construction-materials average index is 93. The building-materials index of the U. S. Bureau of Labor Statistics will average 86 or 87 for the year.

The action of prices in the United States is a marked contrast with cost of construction in England, as is indicated by Fig. 14 showing both the "Economist" index and the *ENR* index. The former represents a gradual decline, the latter shows a sharp fall between 1930 and 1932 and an almost equally sharp rise in 1933 and 1934.

Local price movements

Of all price fluctuations for the year, lumber prices were the most mixed. Southern pine behaved quite differently from Douglas fir, and delivered prices for southern pine show no relation to wholesale price of longleaf timbers. Finally, price movements in one pricing center were totally different from those in others.

Illustrative of local price movements, brick prices ranged from 2 per cent below last year at Kansas City to 57 per cent above at Minneapolis. The average increase for the twenty cities regularly listed by *ENR* was 15.2 per cent. The average without Minneapolis was an increase of 13 per cent over 1933.

Sand prices declined in five cities. Increases ranged up to 27 per cent (Los Angeles). The average for comparable cities was an increase of 5.3 per cent (seventeen cities).

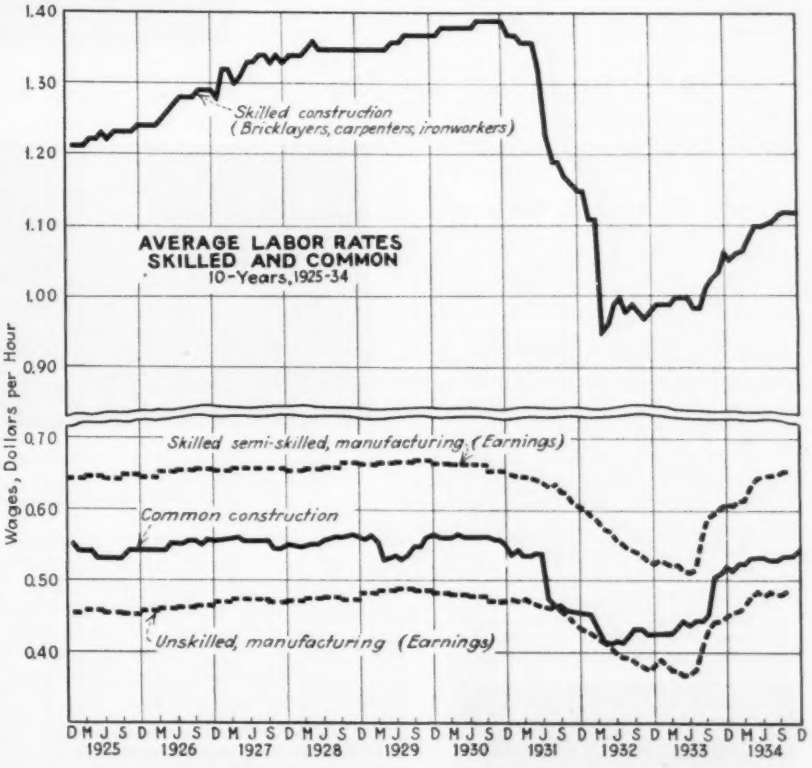

AVERAGE LABOR RATES
SKILLED AND COMMON
10-Years, 1925-34
Skilled construction
(Bricklayers, carpenters, ironworkers)
Skilled semi-skilled, manufacturing (Earnings)
Common construction
Unskilled, manufacturing (Earnings)
Wages, Dollars per Hour
1.40
1.30
1.20
1.10
1.00
0.90
0.70
0.60
0.50
0.40
D M J S D M J S D M J S D M J S D M J S D M J S D M J S D M J S D M J S D
1925 1926 1927 1928 1929 1930 1931 1932 1933 1934

FIG. 9—CONSTRUCTION WAGES moved up during 1934, but not at as high a rate as in 1933 and not at as high a rate as manufacturing labor earnings.

FIG. 8—CONSTRUCTION employment exceeded maintenance employment on highways throughout 1934. Both reached new highs for the four years since 1931.

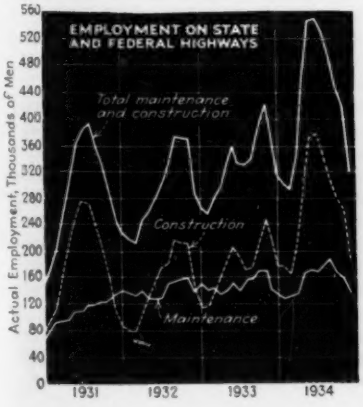


FIG. 10—EMPLOYMENT IN ALL FIELDS reached a three-year high in 1934.

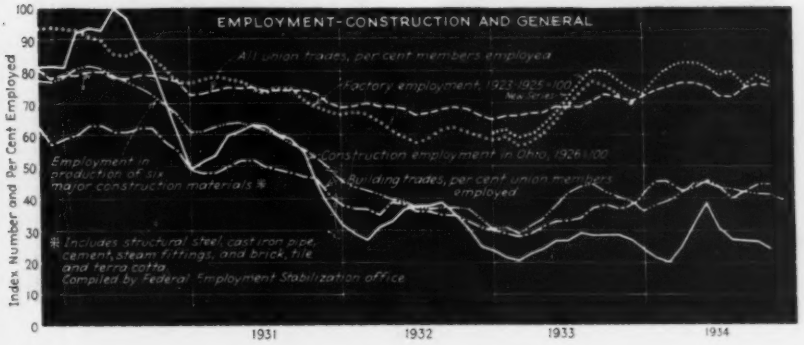


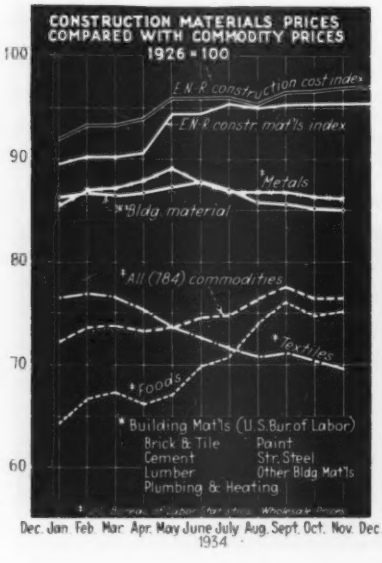
FIG. 11—THE ENR COST INDEX moved upward but at a declining rate during 1934.

Gravel prices behaved much as did sand, showing a decline in seven cities (42 per cent in Birmingham). Increases ranged up to 50 per cent (Detroit), and averaged 3 per cent (eighteen cities). Ignoring the exceptional drop at Birmingham and the exceptional increase at Detroit, this average remains an increase of 3 per cent.

Basic materials

In the production of three basic construction materials, steel enjoyed a high volume in the first half followed by a sharp summer decline and marked recovery in the last fall (Fig. 13). Cement production got an early spring start and was generally higher for the year. Lumber production was irregular with an early spring peak followed by a gradual decline, until a second peak in the late summer followed the reduction in minimum code prices for the smaller-dimensioned material.

FIG. 12—BOTH construction materials and building materials prices are higher than the all-commodities average and particularly the perishable commodities.



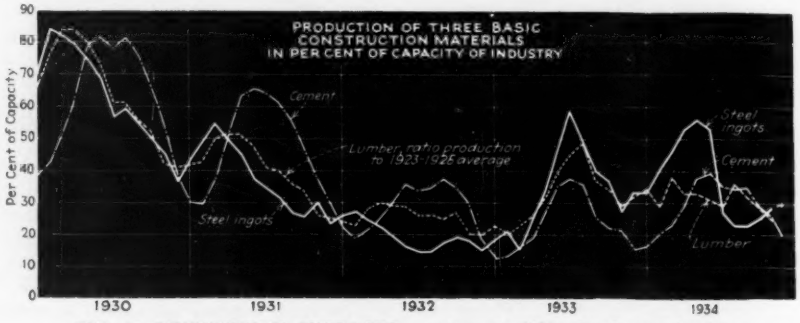
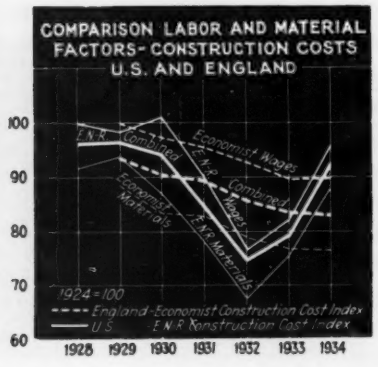


FIG. 13—PRODUCTION AVERAGES moved up in 1934. Lumber production moved up and down. Steel dropped sharply in mid-summer, then started up again. Cement held pretty well to its normal pattern.

FIG. 14—A CONTINUING moderate decline in English construction costs is in marked contrast to the sharp decline and almost equally sharp recovery in U. S. construction costs. The relative position of labor and materials is similar with a wider spread in labor in England.



The outlook for 1935

Forecasting the trend of construction for 1935 is difficult, but all indications point to a maintained rate of increase. Public works will provide the greatest share, though there are encouraging signs of a slow revival of private construction. Residential building should be strengthened by the Federal Housing Act. Industrial building is expected to show some gain, especially if the hoped-for revival in the durable-goods industries materializes. Commercial building must wait for a marked improvement in private financing and is hardly expected to improve much this coming year.

Public works will be increased by the effects of the 4.8-billion dollar works bill now pending in Congress. There is also a strong possibility of an increase in normally-financed state and municipal work because of the improved bond market. All factors considered, it looks as if we are headed for a 4-billion dollar construction market in 1935. On present indications the start in the early months will be slow, but increased activity in late summer and early fall seems assured.

Drought, Weather and Streamflow

Subnormal precipitation in the early part of the year caused severe drought conditions throughout the arid and semi-arid regions and resulted in disastrous crop losses, while high summer temperatures, low groundwater levels and unprecedentedly low river discharges increased the difficulties of the affected regions - - - Records dictate caution in further expansion of water use.

BY JOHN C. HOYT
Hydraulic Engineer, U. S. Geological Survey

SEVERE drought conditions over a large area of the country characterized the year 1934. The drought was not the result wholly of a shortage of total precipitation, but rather of unequal distribution of precipitation throughout the year, together with excessive heat and warm winds. The worst effects were confined to the semi-arid and arid areas.

When the year ended, the weather was practically normal in most states, and drought conditions in the main had disappeared except in the eastern Ohio Valley and northern and western plains. In most sections excess precipitation during the fall was especially favorable for the replenishment of depleted surface and groundwater supplies. Conditions were generally favorable for 1935 being a good water year.

Precipitation

The total precipitation for the year 1934 was markedly subnormal—that is, below 80 per cent of normal—in thirteen states. In twelve states it was between 80 and 90 per cent of normal. Previous minima were equaled or broken in five states—Ohio, Indiana, North Dakota, South Dakota and Colorado. In 1930 previous minima were broken in fourteen states. Yet 1934 was far worse in its effect.

As Fig. 1 shows, in the winter months, starting with December, 1933, there were 25 states that had noticeable deficiencies in precipitation, receiving less than 85 per cent of the normal. The states where major shortages occurred were those in the Missouri, upper Mississippi, Ohio and Great Lakes drainage basins.

During the spring, shortages were greater and more widespread; 27 states had notable deficiencies. These include all the arid states except Washington, all the semi-arid states except Texas, and those humid states in the upper Mississippi, Ohio and Great Lakes drainage basins. In the critical areas, especially in the Dakotas, Nebraska, Minnesota and Iowa, the total precipitation ranged from only 29 to 44 per cent of normal.

During the summer, major shortage in precipitation continued in seventeen states—those in the semi-arid region and in most of the states bordering them on the east and west. However, the deficiencies were in no case so great as during the two preceding quarters, and the effects would probably not have been especially serious if it had not been for the shortage of precipitation in the winter and spring.

During the last quarter of the year precipitation was normal or above over most of the country.

Temperature

Unusual temperatures also prevailed during the year in most sections of the country. The winter in the northeastern states was much colder than usual, and in February most previous records, both of severity and duration, were broken as far south as Virginia. West of the Mississippi, however, there was an unusually mild winter.

The summer of 1934 was unusually warm the country over, and previous temperature maxima were exceeded in ten states. There were fifteen states in which temperatures of over 100 deg. were recorded on more than 50 days, and in nine of them this condition prevailed on more than 75 days. All states west of the Mississippi had maximum temperatures of 109 deg. or more.

Temperatures during the fall were also generally above normal.

Ground and surface waters

As a result of experience gained during the drought of 1930-31, there had been throughout the country as a whole a material extension of the facilities for obtaining water, and consequently the effects of the drought of 1934 on water for domestic and industrial uses were greatly lessened. In the humid region there were practically no serious water-supply shortages except in the states bordering on the Mississippi River. These shortages were primarily in the

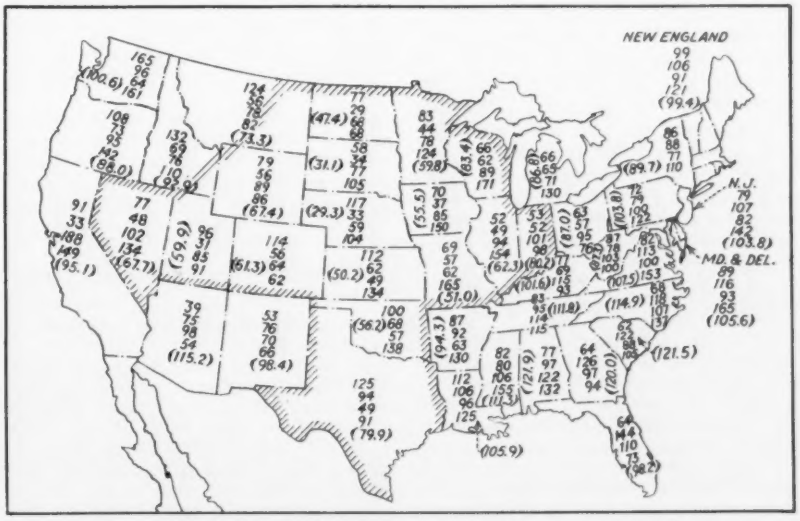


FIG. 1—SEASONAL DISTRIBUTION of precipitation and estimated crop yields for 1934. The first four figures give the per cent of normal precipitation for the season and area noted. First figure, December, 1933—February, 1934; second figure, March, 1934—May, 1934; third figure, June, 1934—August, 1934; fourth figure, September, 1934—November, 1934. Figure in parentheses is the estimated combined yield per acre of 33 important crops expressed as a percentage of the ten-year (1921-1930) average yield. Acreage totally abandoned because of drought losses was not included in computing the yield. Shaded line bounds area of greatest drought effects.

rural sections and the smaller towns, as adequate reserves had been provided for most of the larger cities.

In the rural portions of the semi-arid region on the other hand, serious shortages were experienced on account of the failure of shallow wells and the drying up of ponds, lakes and small streams. The urban supplies, which, in the main, come from deep wells and the larger streams, were adequate in most localities, although in some areas it was necessary to curtail consumption and develop additional supplies. Shortages were especially noticeable in the Red River drainage basin of Minnesota and North Dakota.

Deficient precipitation during the usual replenishment period resulted in little or no groundwater recharge in main drought areas, so that available groundwaters were in a large measure those carried over from the preceding year. Consequently the groundwater table fell quite generally below the outlets of springs and the bottoms of streams and wells, materially cutting off the groundwater contribution to surface waters and to domestic water supplies.

The lowering of the groundwater table and the shortage in precipitation in the drought areas in 1934 had a noticeable lowering effect on streams, lakes, ponds and reservoirs. This effect of the drought was most noticeable on streamflow in the upper Mississippi, Hudson Bay, Missouri, Colorado and Great Basin drainage areas. In these areas many previous records of minimum flow were broken, both as to total annual flow and the flow for shorter periods.

In the accompanying table are a few examples showing the effect of the drought of 1934 on streamflow in the principal drought areas.

In arid and semi-arid parts of the country there was a general lowering of lakes, ponds and reservoirs, which in many localities entirely dried up or were exhausted by irrigation and other uses. During the year ending October 30, 1934, thirty Reclamation Bureau reservoirs having an aggregate capacity of 13,000,000 acre-ft. sustained a net loss of 1,800,000 acre-ft. and had only 1,160,000 acre-ft. in storage at the end of the year. This is an unusually low carry-over; and unless there is a material improvement in precipitation before the next irrigation season, 1935 will be a critical year for the areas dependent on these reservoirs.

Planning for the future

Following closely on the drought of 1930-31, the drought of 1934 emphasizes certain points that have important bearing on future planning in which water supply is a basic factor. Although far from adequate, records of precipitation, temperature, streamflow and other natural phenomena are now of sufficient length to give an indication as to how far activities dependent on water can be extended without danger of serious loss on account of deficient supply.

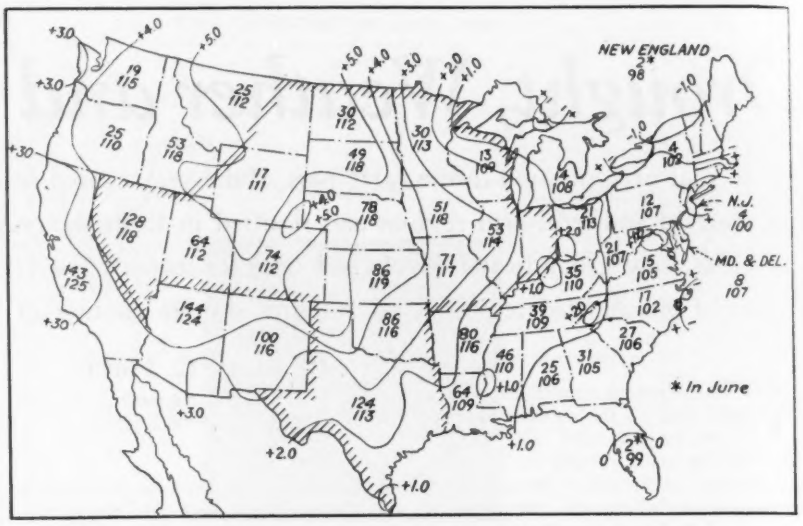


FIG. 2—ABNORMALLY HIGH TEMPERATURES prevailed during the summer months. The first figure shows the number of days in which the maximum temperature was more than 100 deg., the second figure the maximum recorded temperature during July and August. Lines denote excess over normal.

1. For the humid parts of the country these records indicate that there are ample supplies, if properly developed, to provide for present needs and in most sections for additional needs if expansion is wisely planned.

2. In the arid parts of the country most localities have adequate water to meet existing needs if it is properly developed and used. This, however, will require much additional storage and more economical practices. Special caution should be exercised in expansion in the arid areas until more information is available in regard to the amount of water that can reasonably be depended upon.

3. The most serious water-supply problems of the country are in the semi-arid areas, which since their early settlement have had more or less trouble with their water supplies, especially as related to agriculture. The indications are that much readjustment must be made in these areas before they can be placed upon a secure basis in respect to water.

We have now reached a time in the development of the country when much more careful consideration must be given to water supply than has been given in the past, or serious consequences will result. As national development increases, detrimental effects of droughts increase, and they will continue to increase unless a proper relation between water supplies and requirements is established and maintained.

The effects of the droughts of 1930-31 and 1934 emphasize the need for more complete and systematic studies on a continuing basis of our country's water resources and of the possibilities for their development. Danger of loss due to water shortages cannot be reduced to a minimum unless plans are based on adequate data.

EFFECT OF THE DROUGHT OF 1934 ON STREAM FLOW IN THE PRINCIPAL DROUGHT AREAS:

Stream and Station	Drainage Area, Square Miles	Period of Record, Years	Discharge				
			Mean for Period, Sec.-ft.	1934		Minimum Year Prior to 1934	
				Sec.-ft.	Per Cent of Mean	Sec.-ft.	Year
Red River, Fargo, N. D.	6,420	32	468	17.5	3.8	41.7	1933
Red River, Grand Forks, N. D.	25,500	52	2,260	245	10.8	351	1931
Minnesota River, Montevideo, Minn.	6,300	25	514	4.4	0.9	32.7	1933
Minnesota River, Mankato, Minn.	14,600	31	2,320	136	5.9	291	1931
Mississippi River, Elk River, Minn.	14,500	19	4,260	1,450	34.0	2,160	1933
Mississippi River, St. Paul, Minn.	36,000	42	9,210	1,935	21.0	3,190	1931
Mississippi River, Le Claire, Iowa	88,600	61	48,200	22,500	46.7	24,400	1931
Gasconade River, Waynesville, Mo.	1,680	20	1,400	502	35.9	550	1917
Grand River, Gallatin, Mo.	2,250	13	1,120	118	10.5	360	1931
Missouri River, Mobridge, S. D.	208,700	6	19,500	13,800	70.8	13,000	1931
Missouri River, Boonville, Mo.	505,700	9	58,000	23,730	40.9	31,800	1931
Colorado River, Lee's Ferry, Ariz.	107,900	40	20,000	5,480	27.4	8,600	1931

Note: The above figures are for the water year Oct. 1 to Sept. 30, except for the Mississippi River at Le Claire and for the Colorado River at Lee's Ferry, which are for the calendar year.

BERDOO CAMP, Los Angeles-Colorado River Aqueduct, in Coachella Mountains, from which the driving of 33 miles of tunnels is directed. One tunnel portal is in the right foreground

PROGRESS ON LARGE PROJECTS

Water-Supply

✦ **El Capitan Dam**—Construction of the $3,000,000 El Capitan Dam for the city of San Diego was practically completed during the year, and runoff from the San Diego River now is being stored in the 118,000-acre-ft. reservoir. The dam, which is 220 ft. high, is a combination rock and earthfill structure. Future work in connection with the dam will include a pipe line from the dam to an existing conduit some 8 miles downstream, and a water-treatment plant.

✦ **Colorado River Aqueduct**—Tunnel driving has been the major feature of work on the aqueduct between the Colorado River and the metropolitan district surrounding Los Angeles. At the end of the year 56 of the 91 miles of tunnel had been driven. At least some work was done on all tunnels, and concrete lining was begun at several points. Work has been started on 145 miles of canals, conduits and siphons, and in the distributing system contracts have been let and an early start is to be made on the Monrovia and Pasadena tunnels, which total 10 miles in length. The transmission line that is to furnish power for the five pumping plants along the aqueduct will be under construction during 1935.

✦ **Parker Dam**—At the intake of the Colorado River Aqueduct, Parker Dam is being constructed across the Colorado River from the California to the Arizona shore at a point where foundation conditions necessitate a dam 320 ft. high to raise the water surface 85 ft. The dam will be a concrete structure, arched in plan and 800 ft. long on the crest. The Bureau of Reclamation undertook construction of the dam for the Metropolitan Water District of Southern California and awarded contract upon which preliminary construction started in September. Subsequently work on the dam was stopped on account of objections to the work on the part of Arizona. The contractor is carrying forward such work as can be done on the California side until the dispute is settled.

✦ **Rodriguez Dam, Mexico**—Good progress during the year on Rodriguez Dam south of San Diego brings near to completion this buttress-type structure of record height. The east wing is three-fourths complete; the spillway, exclusive of gates, apron and training walls, is about 94 per cent complete, and the cutoff wall, extending 295 ft. below streambed, is finished except for filling three of the ten construction shafts.

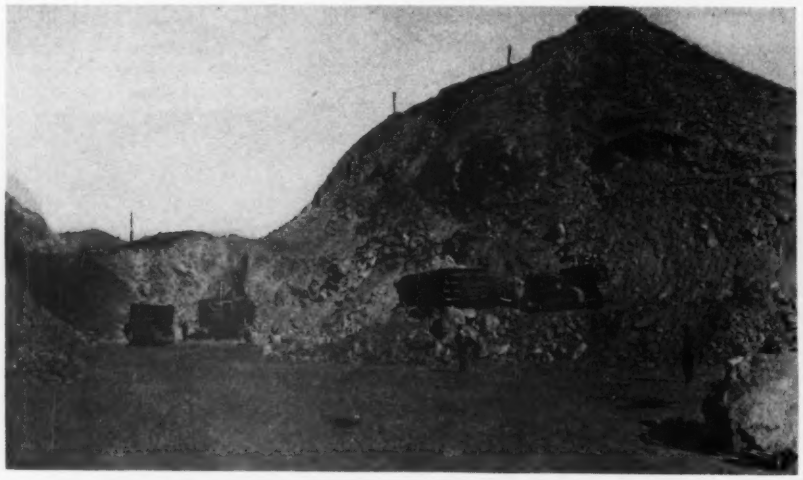
✦ **Madden Reservoir, Canal Zone**—The dam forming Madden Reservoir to supplement the water supply of the Panama Canal was completed late in the year. Storage of water had been begun previously, and water was discharging over the spillway before the end of December. Installation of the power-house machinery is in progress.

✦ **All-American Canal**—Several contractors are at work on the upper end of the All-American Canal (where the canal capacity is 15,155 sec.-ft.) and have been working in rock cuts through Pilot Knob and at three other points east of the sand hills. The Bureau of Reclamation has carried on force-account work on a 7-mile stretch west of Calexico, to aid needy residents. The portion of the canal now being constructed is 30 miles of the ultimate 80-mile main canal. Designs are being made for the diversion dam (Imperial Dam), the desilting works, and railroad and highway crossings. Five hydro-electric plants of a total capacity of 60,250 kw. ultimately are to be built along the main canal. In its final development the All-American Canal project is to cost $38,500,000, and the total irrigable area included will be 842,500 acres served by gravity and an additional 188,600 acres served by pumping. The Imperial Irrigation District now comprises about 500,000 acres.

✦ **Moffat Tunnel Water Diversion**—After more than a year of negotiations the Denver Municipal Water Commission perfected arrangements for $3,500,000 PWA loan for enlarging and lining the pioneer bore of the Moffat Tunnel to divert Fraser River water under the continental divide into the eastern slope watershed. Bids for the work were received Jan. 23 and award has been made pending only approval by the PWA. Mucking operations are about to start with concrete lining to follow.

✦ **St. Louis Waterworks**—A 13-mile pipe line from Stacy Park Reservoir to St. Louis, Mo., had 19,000 ft. completed at the end of the year. This work was done in 2½ months' time since June, 1934; the remainder of the time it awaited the decision of PWA on the proper coating and methods of testing. The line consists of 47,000 ft. of 60-in., 11,000 ft. of 54-in. and 10,000 ft. of 48-in. steel pipe delivered in 40-ft. lengths.

✦ **Chicago Ave. Water-Supply Tunnel**—Work on the 12-mile Chicago Ave. tunnel and new Dever crib, together costing $13,000,000, progressed at a uniform rate during 1934. The crib is practically completed, and the tunnel will be ready for use by July 1. During the year 2,649 ft. of 16-ft. tunnel, 1,389 ft. of 13-ft. tunnel and 100 ft. of 10-ft. tunnel, all in rock, were driven. Concrete lining was completed in 10,000 ft. of 16-ft. section, 7,345 ft. of 13-ft. section and 1,400 ft. of 10-ft. section. The new Cermak electrically driven pumping station (formerly Harrison St.) will replace two



ROCK CUT AT PILOT KNOB on the All-American Canal in Southern California.

BOULDER DAM as it looked at the close of the year. Storage of water in the reservoir behind the dam began Feb. 1, 1935.

obsolete steam-operated units and one motor-driven unit. With the necessary tunnel connections, its cost will be $2,250,000. Foundations and tunnel connections are complete, and work is now progressing on the superstructure. Operation is set for July 1.

✦ **Milwaukee Purification Plant**—The cofferdam around the site of the proposed 200-m.g.d. filtration plant offshore in Lake Michigan near the North Point pumping station at Milwaukee is ready to be pumped out so that the concrete substructures of the building can be placed. A 750,000-gal. underground concrete washwater tank has been constructed near the shore in a public park on a high bluff. Contracts to date amount to $300,000.

✦ **New York City Water Supply**—Contracts totaling $764,000 were awarded during the year for the valves, gates, etc., required for the operation of the second delivery tunnel, known as city tunnel No. 2, New York, extending from Hill View Reservoir in Yonkers through the boroughs of Bronx and Queens and into Brooklyn. The entire tunnel is completed except for the installation of the operating equipment, testing and unwatering. It is expected that the tunnel will be placed in service during the latter part of 1935.

✦ **Boston Water Supply**—Progress on the Quabbin Reservoir project of the Metropolitan Water Supply District of Boston during 1934 included completion of the 1,500-ft. pneumatic-caisson cutoff wall at Quabbin Dike, completion of the last 10-mile section of the 24.6-mile Wachusett-Quabbin Aqueduct, except for the finishing of two shafts, the recent award of contract for the 2,500,000 cu.yd. Quabbin Dike, to be built by the full hydraulic method, and miscellaneous construction operations. To remove sewage from several institutions located on the watershed, a 9-mile line of 10- to 16-in. cast-iron pipe was completed, tying in with the sewerage system of Worcester. Relocation of highways in the reservoir area was continued, 21 miles of 30-ft. bituminous-surfaced roads being built during the year on the west side. Highway relocation on the east side will be carried on during the coming year. Bids are soon to be called on the cutoff wall of the main dam, to be built on Swift River to create the reservoir in conjunction with Quabbin Dike. Exploratory caissons have been sunk at the site.

Bridge Construction

✦ **Golden Gate Bridge**—The south pier of the Golden Gate Bridge at San Francisco has been the critical feature of that project. After completion of the elliptical concrete fender ring (155x300 ft. in plan) for the south pier and within the protection thus afforded, a concrete seal 65 ft. thick was poured through tremies on rock bottom, where the foundation previously had been prepared by blasting and dredging at a depth of slightly more than 100 ft. By the end of the year the concrete pier proper had been completed within the fender and was ready for the steel tower that will duplicate the 746-ft. tower completed during the year on the north end of the 4,200-ft. span. Approaches, fabrication of structural steel and drawing of wire to be used in spinning the cables have been carried forward while work on the pier was rushed, and present schedule calls for having the bridge ready for traffic May 1, 1937.

✦ **San Francisco-Oakland Bridge**—Foundation work representing a total expenditure of $11,600,000 has been completed in both West and East Bay portions of the San Francisco-Oakland Bridge. The last of the four steel towers in the west crossing was well under way before the end of the year. About 65 per cent of the cable wire has been delivered, with stringing scheduled to begin about April 1. Features of the west crossing are two 2,300-ft. suspension spans and a mid-stream anchorage in the form of a concrete pier 435 ft. high from lowest concrete to base of steel superstructure. On the double-deck tunnel on Yerba Buena Island the two side drifts and the crown heading have been completed, and side walls are being poured. In the East Bay crossing thirteen of the 291-ft. steel approach spans have been erected. In December the RFC authorized an additional $15,000,000 loan to finance construction essential to the operation of interurban rapid-transit facilities. Of this total $10,000,000 represents an additional allotment, and $5,000,000 is a saving from the $61,400,000 loan previously authorized. Completion of the structure, ready for traffic, is now expected late in 1936.

✦ **Five Oregon Coast Highway Bridges**—The highway that closely follows the Oregon shore line is interrupted by five wide water gaps heretofore crossed by ferries. After delay in arranging federal financing, bridges now are being built

at these locations at a total cost of more than $5,500,000. By the end of the year work was well under way, with industrial machinery and plant installation complete on all jobs and some of the concrete piers finished in some locations. All five bridges are handled as a single project by the state highway commission, through five different contractors.

✦ **Missouri River Bridge, Kansas City**—This public toll structure of a 440-ft. main span and two 417-ft. anchor spans, connecting on the south to the new Seventh St. Trafficway in Kansas City, Kan., and on the north to the Missouri state highway system, was brought to virtual completion late in the year. It will be opened early in 1935. Contract has just been let for a large viaduct over the Fairfax industrial section, which will improve the south approach to the bridge.

✦ **Mississippi Bridge, New Orleans**—All of the nine river piers of the combined railway and highway bridge across the Mississippi River, a few miles above New Orleans, are completed. Four of these piers, sunk through sand islands by open dredging, were sealed at 174 ft. below mean Gulf level. All of the substructure and superstructure of the approaches (total length 19,500 ft.) are complete. Erection of steel on the nine main river spans (3,500 ft.) is 50 per cent complete, three of the deck spans on the east side are complete, and the concrete deck is laid. The east half of the cantilever span is erected, the west half is 15 per cent erected, and about 40 per cent of the 500-ft. span is up. Driving of the falsework for the 330-ft. span is under way.

✦ **Missouri River Bridge, Omaha**—This mile-long bridge, with a 5¼-mile earth-fill approach on the Iowa side of the river, progressed to the halfway mark or better during the year. Known as the South Omaha Bridge, it is being built by a city bridge commission. All but two of the 24 main piers were completed during the past year, as was the steel superstructure for the twelve deck spans of the Omaha approach. Bridge construction has been carried on simultaneously with the channel-straightening work of the army engineers, which involved shifting the channel some 2,000 ft. west to a position under a 1,050-ft. two-span continuous truss, upon which steel erection was starting at the beginning of the year. Due to low water in the river, the channel did not shift as fast as expected, and most of the bridge work has therefore been done on dry land.

✦ **Davenport Bridge**—Rapid progress was made on this public toll structure, which stretches a mile across the pool formed by the recently completed Rock Island Dam in the Mississippi River, until ice conditions forced all floating equipment to tie up until spring. All foundations are well along toward completion, and the steel towers for the 740-ft. suspension span over the main navigation channel are erected. The bridge, being built by a special commission of the city of Davenport, Iowa, is located some 2 miles upstream from the present bridge between Davenport and Rock Island, Ill. Consisting of steel-beam and continuous-truss span approaches and a loaded-backstay suspension bridge of 1,480 ft. total length, the new structure has its eastern terminus in Moline, Ill., and its western terminus in the village of Bettendorf, Iowa.

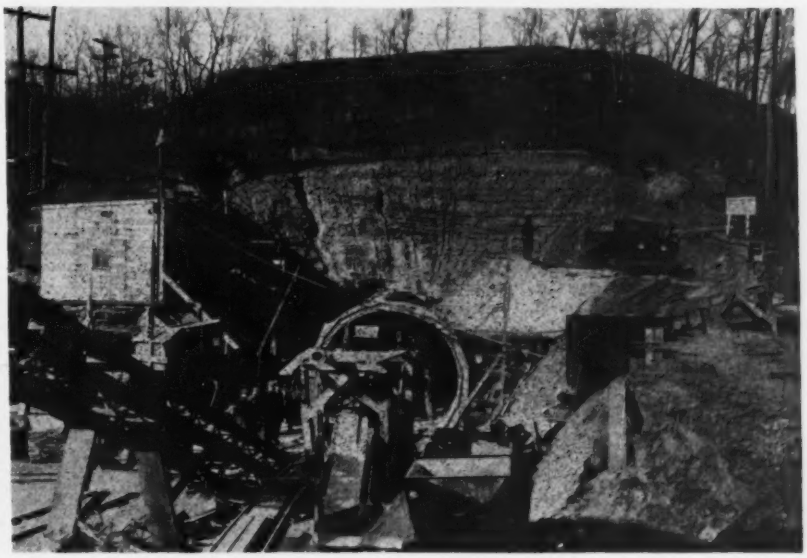
✦ **Grand Island Bridges**—The two steel highway bridges being built as toll projects by the state of New York over Niagara River, connecting the mainland with Grand Island, will be completed in 1935. Both bridges are of continuous-truss design, with through trusses rising above the roadway as arches to clear the navigation channel. The north bridge, on the outskirts of Niagara Falls, is about complete, except for finishing of roadway paving. Steel on the south bridge, between Buffalo and Tonawanda, has just been closed, and the river spans are nearly ready for roadway paving. The approaches to this structure have been completed.

✦ **Rip Van Winkle Bridge**—With the exception of the concrete deck, whose construction must await warmer weather, this Hudson River crossing connecting the towns of Catskill and Hudson, N. Y., south of Albany, was completed in 1934. Ten deck-truss approach spans and a cantilever bridge of 800-ft. main span and 400-ft. anchor spans compose the structure. The approach roads are complete, and the bridge will be opened about July 1.

✦ **Triborough Bridge, New York**—During the year the structural-steel towers and cable bents for the 1,380-ft.-span

MADDEN DAM in the Canal Zone began discharging water over the spillway in December. The reservoir is for storage and flood control.

SOUTH PORTAL of 13-ft., 10-in. tunnel in St. Peter sandstone for outlet sewer leading to Minneapolis-St. Paul sewage-treatment plant.



TOWERS AND CABLE BENTS of the new Mississippi River bridge at Davenport ready for cable stringing as soon as ice conditions in the river permit footwalk erection.

suspension bridge over the East River at New York were completed ready for cable spinning in the spring. Work on the foundations for the viaduct, which extends across Wards Island from the East River to the connection with the Manhattan and Bronx branches, was well advanced. Bids are being received next week on the piers for the Harlem River and Little Hell Gate lift bridges on these branches and for the viaduct on Randalls Island; designs for these two lift bridges are complete. The Queens approach has been completed, street widening on the Bronx approach is under way, and the Manhattan approach, revised during the year to extend south along the riverfront from 125th to 92d St., is in the preliminary design stage.

Sewage Treatment

✦ **Springfield, Mo., Sewerage**—Following a PWA loan and grant of $1,000,000 to Springfield, Mo., for sanitary sewers, treatment plant and flood control, most of the work was put under contract and the remainder will probably be let by March 1. The project is split into 25 items: eleven for sewers, $153,000; three for two disposal plants, $172,000; nine for flood control, $504,500, and one for the covering of Jordan Creek, $154,500.

✦ **Cedar Rapids Sewer and Treatment Works**—During the past five years Cedar Rapids, Ia., has installed a complete intercepting-sewer system, including an inverted siphon river crossing and local lift station at a cost of $440,000. In 1933 the PWA authorized a loan and grant of $638,000 and since then all contracts for the work have been let. Essentially complete are a laboratory, trickling filters, final clarifier units, automatic screen station and incinerator, grit and grease remover units and radial flow clarifier. Sludge digestion tanks, with power plant and sludge filter building are half done; an automatic pumping station and pressure line for industrial wastes and chemical precipitation plant have just been contracted for.

✦ **Minneapolis-St. Paul Sanitary District**—Following the decision to use chemical precipitation at times of critical river condition, the Minneapolis-St. Paul Sanitary District has proceeded to prepare plans and specifications for a contract covering screen and grit chambers and bypass on which work is expected to start in April. Settling-tank contracts will be awarded in the summer. This project has three classifications—work exclusively for St. Paul, for Minneapolis, and for the two cities jointly. Only over the latter has the district supervision. St. Paul has four contracts totaling $400,000 under way, Minneapolis two contracts at $220,000, and the district five tunneling contracts. The total contract price of all common work now under way or completed is $2,328,000, of which 11 per cent has been completed. During 1935 four intercepting sewer contracts, $2,000,000, are expected to be awarded. The total estimated cost of this project is $15,225,000.

✦ **Milwaukee Sewage Plant**—A 70-m.g.d. extension to the Jones Island plant of the sewerage commission of Milwaukee will be placed in service early this spring. This will increase the capacity to 155 m.g.d., sufficient to serve until 1945. Tanks and channels were completed last summer.

✦ **Columbus Sewage Treatment**—Construction of a new 50-m.g.d. sewage-treatment plant for Columbus, Ohio, has been started, contracts for the aeration tanks and pipe gallery, the final settling tanks, the preliminary treatment tanks, the outlet conduit and the sludge filter station have been let, and work on all is in progress. Plans and specifications for the remainder of the work are being prepared, and contracts will be awarded during the coming year. The total cost of the project is estimated at $3,400,000.

✦ **Sanitary District of Chicago**—Contrasted with no construction in 1933, great progress was made in 1934 in the program of the Sanitary District of Chicago, $6,800,000 being expended up to Dec. 1, 1934. The population equivalent under treatment is now 2,537,000, or, on a 100 per cent basis, 1,611,000; or 31.4 per cent of the total sewage within the district. Sale of $42,000,000 bonds to PWA enabled resumption of work shut down for two years and $8,000,000 of new work to be completed. A $20,000,000 program is laid out for 1935 to complete the West Side intercepting sewer, West Side treatment works (sedimentation only) and the Calumet treatment-works extension (activated sludge). This will permit a cut to 5,000-sec.-ft. in the diversion from Lake Michigan at the end of 1935. The Lockport power house is being rehabilitated to increase by 50 per cent the output when the diversion is cut to 1,500 sec.-ft. in 1938. The district, in cooperation with CWA, last winter put 15,800 men to work on temporary projects. This year's program comprises the Southwest intercepting sewer and Southwest treatment works. A 40-ton dewatering and incineration plant is to be built at Calumet at once, with the Southwest installation to follow.

✦ **Cleveland Sewage Disposal**—The sewage-disposal program under way at Cleveland, Ohio, involves the expenditure of $12,000,000 for the new Easterly plant and $2,000,000 for betterments and enlargements at the existing Westerly plant. Construction work costing about $5,000,000 has been completed upon the Easterly plant, less than $500,000 of this amount being the work done during the year 1934. At present there is under contract upon this project work costing about $1,000,000, and bids will be received upon an additional amount, roughly $2,250,000, during the next three months. Upon the Westerly plant completed work amounts to $250,000, and work under contract amounts to $175,000. During the next three months bids will be called on $400,000 more. Bids on the remaining parts of the work will be received during the latter part of this year.

✦ **New York City Sewage Treatment**—Lack of funds has prevented further construction work on the Wards Island sewage-disposal project, New York. Some $5,500,000 has been spent on construction work and engineering on this project so far. Plans for the entire project, including the intercepting sewers, are completed, and an application for a loan and grant to the PWA amounting to $25,000,000 has been made for its completion. An allotment of PWA funds of $1,868,000 has been made for the construction of the Coney Island sewage-treatment works. This plant is to have a 35-m.g.d. capacity for the first installation and is to provide for plain sedimentation with chemical treatment and chlorination during the bathing season. Sludge digestion with utili-

zation of digester gases and solids is provided for. Plans are complete, and construction will start early in 1935.

Power Development

✦ **Bonneville Dam** — The Bonneville power and navigation project on the Columbia River has been advanced well beyond the preliminary stages in three major features—namely, main spillway dam, power house and navigation lock. Construction of the cofferdam wall for the south half of the spillway dam was begun in November, while the north half of the channel was enlarged by dredging; power-house foundations have been placed; excavation for the navigation lock has been practically completed and concrete pouring has begun.

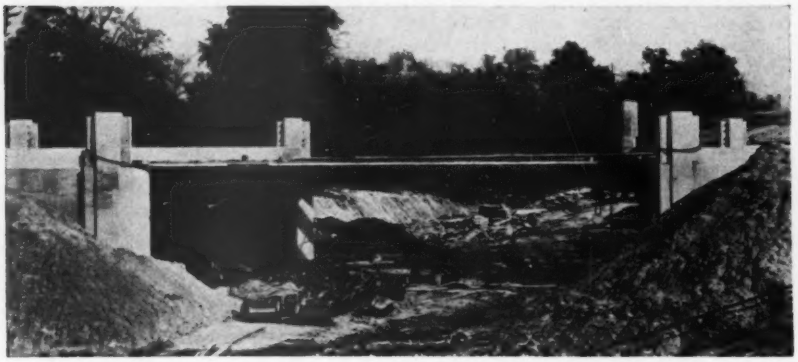
✦ **Grand Coulee Dam**—Preliminary construction work was begun at Grand Coulee Dam a year ago, and during 1934 much has been accomplished on preparatory work, such as the railroad, highways, a bridge of 550-ft. span across the Columbia River, the construction camps, installation of materials-handling equipment and development of the permanent townsite, including all the utilities and facilities of a modern city. The contract for the dam, approved in September, is for $29,339,300. Construction of the large cofferdam on the west side of the river began before the end of the year. The present contract calls for the completion by July, 1938, of the low dam (145 ft. high), which is to be a straight gravity-type structure 3,500 ft. long. If a change is made to the high dam (475 ft.), the time of construction would be five or six years. Present plans are for a power installation of 34,300 kw.

✦ **Boulder Dam**—Speedy and uninterrupted progress has marked all phases of the work at Boulder Dam; most features of the project will be finished nearly two years ahead of schedule; many of these now are nearing completion, notably the dam itself, which will include 3,250,000 cu.yd. of concrete. Celebration marking the placement of 3,000,000 cu.yd. was held on Dec. 5, 1934. The concrete-aggregates plant had finished its work and was ready for dismantling by the end of the year. Powerhouse foundations were completed, the power houses themselves were well under way, and steel towers were erected for the transmission line from the dam to Los Angeles. The fabrication and installation of electrically welded penstock sections 30 ft. in diameter were features of construction in the latter part of the year. Closure of the dam and the beginning of storage were scheduled for early in 1935. Appropriations for this project as a whole to the end of 1934 have totaled $94,660,000.

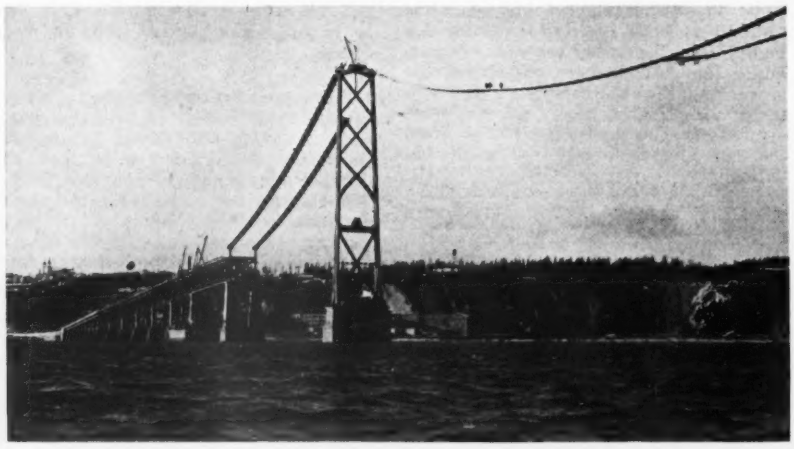
✦ **Loup River Project** — Construction was started during the year on the $7,300,000 hydro-electric project on the Loup River in Nebraska through PWA money allotted to the Loup River Public Power District. Contracts have been awarded for the major part of the canals and dams, and 1 mile of the 27 miles of canal has been completed. Contracts for three 18,000-hp. turbines for the Columbus power plant and three 3,200-hp. turbines for the Monroe plant have been awarded. Generator bids were rejected and are to be readvertised. Work will be in full swing on all units in early spring.

✦ **Sutherland Project**—Combining a storage of 146,000 acre-ft. of irrigation water with a 34,000-hp. power plant, the $7,500,000 Sutherland project of the Platte Valley Public Power and Irrigation District got under way during the year, financed by PWA. Total work contracted to date is $4,250,000 for the diversion dam, Sutherland storage dam,

ONE 746-FT. TOWER of the Golden Gate Bridge is up, and in the foreground work is in progress on the south pier in deep water.



STEEL RIGID FRAMES are used for the bridges of the Oakland Express Highway in Forest Park at St. Louis.



WALKWAYS have been erected for the cables of the 2,370-ft. suspended spans of the 5,700-ft. bridge to the Island of Orleans in the St. Lawrence River below Quebec. Piers and steelwork on approach spans are complete. The bridge is expected to be ready for traffic by next summer.

regulating reservoir dam, all canals, gates and two turbines and generators. Still to be let are contracts for a siphon, power intake, penstocks, surge tank power house, transformers, switching and all transmission lines. To date 650,000 cu.yd. has been placed in the Sutherland dam, 350,000 cu.yd. excavated in the outlet canal and 11,000 cu.yd. placed in the two dams.

✦ **Norris Dam**—About one-third of the total of more than 1,000,000 yd. of concrete in Norris Dam on the Clinch River in Tennessee had been placed at the end of the year. Work in the cofferdam in the river will be completed before high water in the spring. Construction of a power house containing two 56,000-kva. generators is included. The dam and power house will be completed during the latter part of 1936.

✦ **Wheeler Dam**—Construction of Wheeler Dam on the Tennessee River (15¼ miles above Wilson Dam) was begun in November, 1933. At the end of 1934 excavation in the first cofferdam, 1,400 ft. long, had been completed, and a considerable amount of concrete had been placed in the foundations for the dam and power house in that section. Draft tubes and the substructures for eight generators are to be put in, but only one 45,000-hp. unit is to be installed. Work in the second cofferdam is under way, and the third cofferdam is under construction. The river is more than 6,000 ft. wide at the site. Construction of the navigation lock, begun in 1932, was practically completed during 1934. The project will be completed late in 1936.

Flood Control

✦ **San Gabriel Flood Control**—Both San Gabriel dams No. 1 and No. 2 of the Los Angeles County Flood Control District were in trouble in 1934, and progress was affected accordingly. At No. 2 excessive settlement caused such serious damage to the gunite slabs on the upstream side that all of the gunite facing was ordered removed and plans were made for replacing it with three-ply timber planking. A contract also was let for the placing of about 60,000 cu.yd. of additional rockfill. At Dam No. 1 work on the quarry proceeded until the latter part of the year, although only about one-quarter of the material taken from the quarry was approved for placement in the dam. In November the contractor was ordered to suspend work for four months pending decision about revising design of the dam and changing specification requirements so as to facilitate completion with materials and funds available.

✦ **Lower Rio Grande Flood Control**—Construction on the flood-control project in the Lower Rio Grande Valley in Texas began in December, 1933, under a PWA allotment of $1,500,000. An additional allotment of $500,000 was made in July, 1934. The plan contemplates the control of floods on the Rio Grande by improving an existing system of river levees and artificial floodways, in Hidalgo, Cameron and Willacy counties, Tex. During the year, 1934, 7,500 acres of land within floodways were cleared, 6,500 acres of levees repaired, 1,730,000 cu.yd. of earth were handled, 17,600 ft. of bank protection works installed, and numerous control and protection structures were constructed at a cost of $1,350,000.

✦ **Rio Grande Rectification**—Rectification of the Rio Grande in the El Paso-Juarez Valley, as provided by the convention of Feb. 1, 1933, between the United States and Mexico, was begun in March, 1934, under a PWA allotment of $2,800,000. In July, 1934, an additional $500,000 was allotted. The total cost will be $6,000,000. The project is designed to eliminate the flood hazard and stabilize the international boundary line from El Paso, Tex., to the Box Canyon, below Fort Quitman, Tex., a distance of 155 miles by the original river channel, and 88 miles by the rectified channel. Floodwaters will be confined between parallel levees 590 ft. apart throughout the El Paso-Juarez Valley. Caballo Dam, 22 miles below Elephant Butte Dam on the Rio Grande, will form a detention reservoir of 100,000 acre-ft. capacity, designed to control floodwaters originating above the dam site. During the year the American Section of the International Boundary Commission contracted for 3,600 acres of privately owned lands, cleared 2,000 acres of land, and handled about 640,000 cu.yd. of earth in the construction of the channel and the levees. Start of work on Caballo Dam has been delayed pending an application to the PWA by local agencies for an allotment to increase the size of the dam, to permit development of power at Elephant Butte Dam. In December an allotment of $100,000 was made to the U. S. Bureau of Reclamation to cover the additional cost of constructing Caballo Dam, so that it might later be raised to provide a reservoir of 350,000-acre-ft. capacity. Bids on the dam will be requested early in 1935.

✦ **Lake Okeechobee Flood Control**—The Lake Okeechobee combined flood-protection and navigation project in Florida includes a levee 60 miles long extending from far up Fisheating Creek on the west side of the lake along the south and up the east shore as far as Port Mayaca, the outlet to St. Lucie Canal. Over most of its length the levee is being built to El. 34, from 17 to 20 ft. above lake level. From Moore Haven to Bacom Point, 35 miles, a navi-

gation channel adjacent to the levee is included in the project. At the end of the year 38 miles of the levee were practically complete, and by July 1 of this year about 50 miles will be finished, all of the remaining work lying in the section between Pahokee and Port Mayaca. At the entrance of five canals leading from the lake to the south and east massive hurricane gates are being installed. Four gates are 90 per cent complete; the fifth has just been started.

✦ **Mississippi Flood Control**—Construction of flood control works on the Mississippi River south of Cape Girardeau, Mo., has proceeded with the usual regularity along the normal lines of raising levees, bank revetment, control dikes, the opening cutoff channels across narrow necks formed by loops in the river. Since the start of the present improvement in 1928 nearly 500,000,000 cu.yd. of earth has been moved into levees. The rate of progress in 1934 was about 7,000,000 cu.yd. a month. Revetment and spur dike construction proceeded normally, the only new feature being the placing of some asphalt mat revetment in the New Orleans district. At the end of the year eight cutoffs had been opened and were being gradually enlarged by the river.

✦ **Muskingum Valley Flood Control**—Actual construction of the Muskingum Valley flood-control project, involving fifteen dams on the Muskingum River and tributaries, in southeastern Ohio, was started late in December with the award of contracts for Charles Mill and Tappan Dams. The third dam, Wills Creek, was placed under contract in January, 1935, and bids were called for on the fourth, Clendenning, the same month. The remaining eleven dams will be placed under contract this spring.

✦ **Winooski River Flood Control**—Wet weather in the late spring of last year and again in early fall delayed completion of the two earth dams being built by CCC labor, as the remaining uncompleted parts of the Winooski River flood-control project in northern Vermont. About 74 per cent of the 1,140,000 cu.yd. of fill required for the Wrightsville Dam had been placed when work shut down for the winter. The East Barre Dam now contains 91 per cent of its ultimate 522,000 cu.yd.

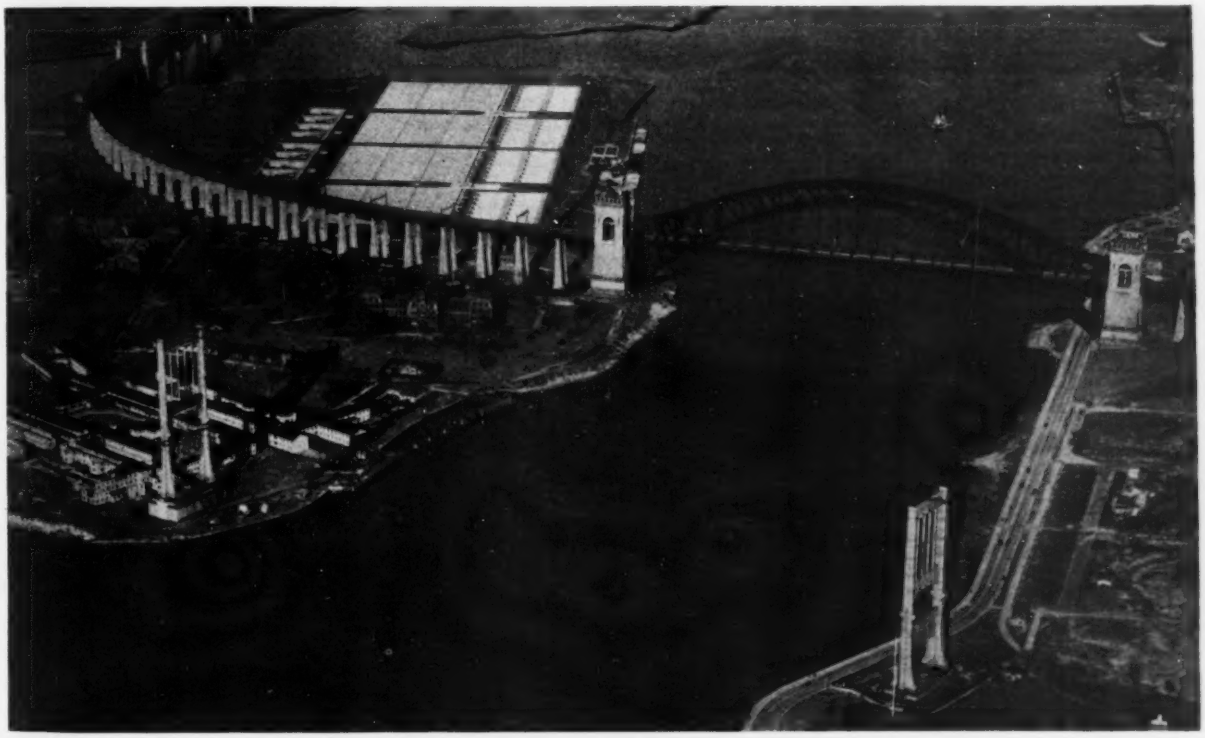
Waterways

✦ **Fort Peck Dam**—Construction of Fort Peck Dam on the upper Missouri River was begun in October, 1933. The dam is to be an earthfill structure, 242 ft. high and 20,000 ft. long over-all, 9,000 ft. being in the main dam and 11,000 ft. in a low dike. It will form a reservoir of 19,412,000-acre-ft. capacity. Railway and highway lines to the dam have been built, also the trestles from which rockfill is being dumped into the toes of the dam. This rockfilling will be carried on through the winter. Driving of the steel cutoff wall, 9,250 ft. long across the valley bottom, is in progress. Hydraulic dredges have been built at the site and put through tests preliminary to beginning hydraulic filling intensively in the spring. Contracts have been let for the excavation of the spillway channel. A complete town with water supply, sewage disposal, gas and electricity has been built and is occupied by the construction forces. About five years will be required to complete the project.

✦ **Missouri River Waterway**—Channel-straightening and stabilization, to permit 6-ft. navigation between Kansas City and Sioux City, have been completed on the 75-mile section of the Missouri River between Kansas City and St. Joseph. The $20,000,000 allotment for work on the 200-mile section north to Omaha has been about 40 per cent spent; greater progress was prevented by the low stage of the river. Between Omaha and Sioux City about $1,000,000 was spent during the year.

✦ **Mississippi River Locks and Dams**—Improvement of the upper Mississippi River, from St. Louis to Minneapolis, to provide for a 9-ft. navigation channel, requires the construction of locks and dams at 27 locations. Prior to the resumption of work in 1932, locks and dams had been built at three points: at St. Paul (1917), at Hastings, Minn. (1930), and at Keokuk, Ia. (1913). In 1933, Lock and Dam No. 15 at Rock Island were completed. At the remaining 23 sites, three locks were completed and thirteen were under construction at the end of 1934. Of the 23 remaining dams, four were under construction at the end of the year, one had just been awarded, and three were scheduled for January awards.

✦ **Ohio River Navigation and Flood Control**—Contract for the construction of the Tygart River Reservoir dam was let in December. Work on Dam No. 3 on the Allegheny River is 77 per cent



TOWERS for the Triborough Bridge over Hell Gate at New York have been completed. Beyond the railroad bridge is the new Wards Island sewage-disposal plant.

complete. Dam No. 2 was completed during the year, as were the locks at Dam No. 3. The cofferdam for the first half of the Montgomery Island Dam on the Ohio was unwatered in July, and by the end of the year 21 per cent of the concrete had been placed. Contract has just been let for the dam across the Ohio below Gallipolis. The parallel locks at that point are about 60 per cent complete. The twin locks for the Winfield Dam on the Kanawha River are about complete, but no work has been begun on the dam. The Kanawha River Dams at London and Marmet, W. Va., were completed during the year.

Transportation

✦ **St. Louis Express Highway**—The Oakland Express Highway in St. Louis, authorized in 1934, extends 3 miles from the city limits to the business district. It is a three-lane roadway without grade-crossings and will connect the new federal highway No. 40 from the west with the municipal bridge leading to Illinois. The western two-thirds of the project is located in and along the southern edge of Forest Park. The eastern portion outside the park will be depressed through one tier of low-value building lots, leaving the existing street system undisturbed through the construction of thirteen bridges for cross-streets. The land cost about $800,000 and construction about $1,500,000. Forty per cent is under contract, and the remainder is scheduled within six months.

✦ **Long Island Parkways**—The new Meadowbrook Causeway entrance to Jones Beach State Park on Long Island was completed during the year, and its connection to Southern State Parkway will be opened this spring. During the year construction work was in full swing over the entire length of the Interborough Parkway between Kew Gardens and Brooklyn and the Grand Central Parkway Extension between the same point and the Triborough Bridge. Contracts were let in the fall for the Laurelton Parkway, about 2 miles long, connecting the western terminus of Southern State Parkway with Sunrise Highway. Also contracts were let about the same time, initiating the reconstruction of 6 miles of the Sunrise Highway as a parkway from the Laurelton Parkway connection to the Brooklyn borough line.

✦ **Midtown Tunnel, New York**—At the New York end of the Midtown Vehicle Tunnel under Hudson River at 38th St. in New York City a full-section heading has been driven 360 ft. riverward from the construction shaft near 11th Ave., and a drift has been carried ahead 300 ft. beyond the large heading. A shield is now being erected at the bottom of the shaft, which will be shoved light to the face of the rock heading, with cast-iron lining being erected. A ventilating shaft, sunk as a pneumatic caisson just off the shore on the New York side, has been landed and sealed to rock. At the New Jersey end of the tunnel a shield has progressed 420 ft. from a shaft sunk at the base of the Palisades. Another shaft, 300 ft. in advance of the first, is being sunk for construction purposes, as the first shaft is for permanent ventilation; construction will start soon on ventilation buildings. As soon as the second shaft is completed and new bulkheads installed, driving with the New Jersey shield will be resumed. On the New York approach extensive demolition of buildings to provide access ways is under way.

✦ **West Side Elevated Highway, New York**—During the year substantial progress was made on the elevated highway along New York's Hudson River waterfront. The section between 38th and 46th Sts. was opened to traffic, so that the highway is now in operation from the Holland Tunnel at Canal St. to 72d St., with the exception of the section between 46th and 59th Sts. In this section, foundations are in, but superstructure erection must await reconstruction of an incinerator on the alignment at 56th St. Bids have just been received on the section from 72d to 76th St. over the New York Central tracks in Riverside Park, and designs are being prepared to extend the highway southward from Canal St. to the Battery. Final design work on this southward extension awaits definite authorization by the city board of estimate.

✦ **West Side Railway Line, New York City**—The first completed section of the New York Central R.R. Company's work of removing its freight tracks from the surface of the streets of New York was put into service in June. It includes a new St. John's Park terminal at Canal St. and an elevated line, largely on private right-of-way, north from the terminal to and around the 30th St. yard. This line, about one mile long, has two or more tracks. North of the 30th St. yards the tracks are to be in open cut to the 60th St. yards, passing under the streets. For this section the right of way has been acquired and cleared of most of the building. Bids on the excavation of the cut for three tracks were called in January, 1935.

✦ **Syracuse Track Elevation**—The New York Central R.R. grade elimination project through Syracuse, N. Y., involves the elevation of a three-track line along the route of the West Shore R.R. through the city, requiring 26 bridges over streets and a creek. A new passenger station is also included in the program. Started last spring, all of the bridges have been completed to the extent that all steel for the superstructures has been placed and completed except for minor riveting. Considerable work remains yet to be done on retaining walls and filling for the grades between streets, and practically no construction work has been done on the new station.

✦ **Pennsylvania R.R. Electrification**—Electrification of the main line of the Pennsylvania Railroad between Washington and New York is practically completed. Regular passenger-train operation will begin in February, and electrified freight service will follow shortly. Included in the work are line improvements through Baltimore, reconstruction of the 30th St. yards in Philadelphia and construction of a new passenger terminal, and construction of a new passenger terminal at Newark, N. J., including new bridges over the Pasaic River. The Philadelphia work is about 80 per cent complete and the Baltimore and Newark projects are about half done.

✦ **New York Subways**—A PWA loan and grant of $23,000,000 is permitting the New York Board of Transportation to complete and put into service the remaining uncompleted sections of the Independent Subway System, except the Sixth Ave. (Manhattan) line. During the year bids were received on 41 contracts, of which 33 were awarded, aggregating $11,000,000. These contracts are for station finish, track work and equipment for eighteen miles of subway on the Houston St. (Manhattan) line, Fulton St. (Brooklyn) line, crosstown Brooklyn-Queens line and the Queens line from Roosevelt Boulevard to 178th St. and Hillside Ave. The Mayor has been authorized to apply to the PWA for a loan of $57,639,000 to build the Sixth Ave. line.

Buildings

✦ **Federal Buildings, Washington, D.C.**—Nearly all the work under the $101,000,000 public building program in Washton has been completed during the past year. The Post Office, Labor and Interstate Commerce buildings now are occupied. Work still is under way on the Archives Building, and additions to the Extensible Building of the Department of Agriculture. Although funds are authorized for the $3,000,000 Apex Building of the Triangle Project and the refacing of the State, War and Navy Building, appropriations have not yet been made, and plans for demolition of the old Post Office Building (with its clock tower) and of the District Building are hanging fire. Several of the wartime temporary buildings have been torn down in the past year. In addition to the $101,000,000 program, an extension of the Interstate Commerce Building is now under way under a PWA allotment of $2,300,000. Plans for the new Interior Building are being prepared. The $9,000,000 Supreme Court Building is nearly completed, and the foundation of a $6,000,000 extension to the Library of Congress has been finished, part of the latter from PWA funds. A story is being added to the present Interior Building to provide more space pending completion of a new building.

✦ **Rockefeller Center, New York**—An important addition was made during the year to the great aggregation of buildings in New York, known as Rockefeller Center. It consists of three connected structures—two of six stories and one of 38 stories—in the north block of the three-block development, fronting on Fifth Ave. The steel framework is up, and the wall enclosure is about 75 per cent complete.

CODES AND CONSTRUCTION • • • 1

Have Codes Aided Recovery?

THE ANSWER is No! Reasons lie in the misguided objectives of NRA, in the failure of the public-works campaign to raise purchasing power, in the absence of policies to guide the colossal code-making task, and in the crusading spirit of "the mad, hectic days" of goldfish-bowl fame.

A. J. HETTINGER, JR.
Executive Secretary, Durable Goods Industries Committee

● February, 1935, sees the construction code entering its second year. Its progress and problems, vital to the future of all whom it touches, whether engineer or contractor, cannot be fully understood unless projected on a background of the NRA code-making adventure as a whole. Dr. A. J. Hettinger, Jr., called to Washington during the early days of NRA and active in the most hectic code-making labors as a member of the NRA research and planning division, here subjects the record to searching analysis. He finds that it has retarded and not promoted recovery.

● Fortunately the construction code, which is free from price-fixing and fair in its labor-industry provisions, has possibilities far beyond those of the code system as a whole. —*Editor.*

WHAT might have been accomplished under a National Industrial Recovery Act will never be known. What has been accomplished by *the* National Recovery Administration is, on net balance, a retardation of industrial recovery in the United States. Ours has been a disorderly economic recovery, more erratic, chaotic, and unpredictable in its movements than that of any nation of commercial importance in the world. Sweeping advances, both in 1933 and 1934, were followed by confidence-wrecking, morale-testing declines. We have covered more ground, seen more action, and yet made less gain than the world as a whole. For the defensive character of a recovery in which sentiment has been worse than actual business and long-run confidence has been lacking, the NRA must accept a definite, even though quantitatively indeterminate, responsibility.

Basic NIRA philosophy

The Recovery Act occupied a major position in the emergency legislation of the spring of 1933. As indicated in its title, it was directed toward "national industrial recovery." It rested upon a "purchasing power" philosophy. Every effort of the Administration during those days was focused on the problem of restoring commodity price levels to or toward those prevailing in 1926, in part as a form of debtor relief and in part because of a sincere belief that higher prices, almost regardless of how achieved, spell prosperity. Parenthetically, it should be noted that a distorted, forced lift in commodity prices, operating (through codes) disproportionately on different industrial products, may serve to produce disequilibrium rather than equilibrium, thus retarding rather than accelerating the increased production of goods necessary to achieve the President's fine objective of a "more abundant life." Restoration of economic balance, a very different thing, provides through increased demand a sound basis for attaining that end, with flexible increases in commodity prices as a natural concomitant.

NRA's concept of recovery rested upon the application of two principles: mass re-employment and mass increase in purchasing power. The route toward reemployment lay in sharp reductions of working hours, with the implied objective of requiring each industry to absorb as much as possible of its 1929 employment. Increased purchasing power was sought through maximum increases in wage rates; subject only to the ability of the industry to pay, 1929 wage levels were conceived as the objective. Re-employment of millions of men at near-prosperity wage rates would result in a dramatic increase in "purchasing power." That was the theory.

The immediate strain of higher costs on corporate working capital, already reduced through the losses of the depression, was recognized. Increases in the price of articles produced and distributed under the codes were inevitable, but these were to be kept at a minimum during the early and crucial period of the Recovery Administration through (1) appeals to business to confine such advances to a maximum not greater than the increased out-of-pocket costs of production, and (2) application of the internal machinery of the Recovery Administration itself, notably the Consumer's Advisory Board, which, acting both through the NRA and through public opinion, would protect the buyer from unwarranted aggressive action of either producer or distributor. The net result of an increase in "purchasing power" far more rapid than the price of commodities would, it was believed, be increased demand, larger volumes, lower overheads, further gains in employment, and ultimately larger industrial profits. Thus would be generated a spiral of increased business activity which in the end would spell substantial economic recovery.

A major gamble

This NRA program contravened time-tested, orthodox sequences in recovery. It represented a major gamble in favor of the thesis that *economic planning under the government would proceed with such smooth precision as to enable industry to pay near-prosperity wage rates in the middle of a major depression*, and that depleted working capital could stand the impact of sharply rising costs with complete reliance on rapid increases in volumes, lower overheads, and, after a moderate time lag, increased profits. It assumed a high order of administrative skill in correcting the numerous maladjustments between wages, hours, and commodity prices prevailing throughout American business.

Congress itself did not actually think through the National Industrial Recovery Act that it enacted. Controversial points, which called for penetrating debate and clear definition, were glossed over through the enactment of generalized provisions which meant all things to all men. Section 7-A is merely one classic example. Congress evaded the difficult task of laying down an understandable labor policy. Subsequent interpretations of that section by labor and industry have been as far apart as the poles. The National Recovery Administration shirked the embarrassing necessity of defining that section in such

a way as to provide a compass that could be relied on. Every administrative board that has tackled the problem, both within and without NRA, has been guilty of a long series of interpretations which, being based upon the expediency of the moment, were so hopelessly in conflict among themselves that it is probably fair to state that even at this date no employer, no labor leader, no administrative official, and no legislator knows what it means.

Recovery and reform mixed

In this situation the NRA, settling nothing, has, to use an inelegant but thoroughly accurate term, messed up the whole field of American labor relations—with an interminable series of labor disputes and strikes as the inevitable consequence.

The Recovery Administration was born amid what was almost an emotional fervor. Its goal was an admixture of recovery and reform. The framework through which this was to be obtained was characterized as "self-government in industry." That self-government was to be achieved through voluntary codes of fair competition created by industry itself, but audited by the Recovery Administration in order to protect the legitimately paramount public interest. Social reform required the elimination of child labor and the abolition of what can loosely be termed anti-social, sweatshop wages, all too frequent in the distressingly acute competition that characterized the latter stages of the depression. Superimposed upon these were so-called recovery objectives, which in the eyes of the Recovery Administration were represented by as sharp reductions in hours and increases in wage rates as industry could absorb and the establishment of trade practices whose implications were economic rather than social. The political mandate of Congress was interpreted as calling for the organization of labor as a counter-offensive to the organization of industry.

Misplaced reliance on PWA

Fairness requires the frank recognition that the Recovery Administration relied upon the prompt expenditure of the $3,300,000,000 allocated to the Public Works Administration, which was to "prime the pump" by putting to work large numbers of men within a short period of time. That end was not attained. The Public Works Administration allocated funds on paper, but during the crucial first half-year made no *significant* contribution, other than by promise of future expenditure, to re-employment. Deprived of the assistance it had relied upon from public works, the Recovery Administration succumbed to the crisis-and-emergency complex which so dominated Washington during 1933 and the early months of 1934.

In the honest belief that crisis and emergency dominated all else, the Recovery Administration unconsciously made its decisions. Emotion, ballyhoo and speed became dominant. Orderly economic planning in the process of codification was a luxury impossible of attainment because of the time element. The great immediate goal became the once-famous PRA—the President's Re-employment Agreement—and the associated Blue Eagle campaign, which were expected to produce a mass increase in employment and payrolls regardless of cost; this would hold the trenches until the process of codification was completed.

"The mad, hectic days"

The ideal of voluntary codes of fair competition went by the board during the mad, hectic days of emotional and patriotic appeal during the last half of 1933. The objective became complete codification of American business by Christmas. In actual practice, regardless of the amenities of phraseology, industries were told that, if voluntary codes acceptable to the NRA were not submitted, the licensing provisions of the Act would be utilized and codes imposed. Many codes were voluntary in the truest sense of the term, but others were about as voluntary as the action of a victim raising his hands when confronted by a gun.

It is doubtful whether any body of men in the service of the government worked with more sincerity or under greater pressure during these days than did those in NRA. The fervor was that of a crusade. Industrial recovery and reform could only be achieved, as they saw it, by a complete codification of American industry within a minimum time. But NRA, working under a pressure that cannot be understood unless actually experienced, had no clear idea of what those codes should contain.

A codification of American industry is a colossal task. Sound codification required intimate knowledge of each industry for which codes were submitted. Conditions varied from industry to industry. Problems confronting large units in a given industry differed from those faced by the smaller producer. Working conditions and costs of living varied geographically and between small towns and larger centers. No direct correlation existed between labor rates and unit costs. Problems encountered in mass production were very different from those of decentralized distributive units. These difficulties are but typical of those that confronted NRA.

The establishment of sound underlying policies, flexible in their administration, is the essence of successful codification. NRA, operating on crisis-emergency schedules, neither had the time nor appreciated the importance of the establishment of such policies. Entirely without intent, horse-trading characteristics became dominant in the construction of the great bulk of codes.

How codes were made

The actual process of codification must be described briefly. First, a group that represented an industry and embraced numerical preponderance submitted to the Recovery Administration a tentative draft of its proposed code of fair competition. Very frequently this represented the voluntary desire of the industry, but at times action was spurred by the implied threat that if a proposal were not made the Recovery Administration would itself write a code for that industry. Next in sequence came a series of informal conferences between representatives of the industry and the NRA deputy administrator under whom the code would be drafted. Scores of codes were simultaneously in preparation under possibly two dozen different administrators, each interpreting the Recovery Act to the best of his ability. The deputy administrator, working against time, was anxious to drive the code through. He realized it would have to run the gamut of analyses by the Labor, Consumers' and Industrial Advisory Boards' discordant elements in the industry, the Division of Research and Planning, the legal staff, and finally the Administrator himself. The deputy administrator became to a greater or lesser extent a compromiser.

After the Administrator had done his best and felt that the time was opportune, what might be termed a "dress rehearsal" was held. On this occasion were present the deputy administrator and his assistant; representatives from the Labor, Consumers', and Industrial Advisory Boards; the Division of Research and Planning; the NRA legal staff; and the code committee, representing the industry. The proposed code was analyzed section by section, and every effort was made to eliminate conflict in advance of the formal hearing. In the event that this effort met with success, that hearing was scheduled.

The "goldfish bowl"

The formal hearing constituted the famous "goldfish bowl," and was heralded as factfinding in character. All were present who had participated in the dress rehearsal. Industry submitted its proposed code, explained the provisions, and was subjected to such cross-examination as the deputy administrator or other NRA representatives deemed desirable. Interested parties were offered the opportunity of presenting evidence of factual character.

Industry and labor, however, learned very early in the process of codification that the so-called "goldfish bowl" was

essentially a symbol, and that the actual process of codification was carried on after the public hearings by means of what frequently became a long series of post-hearing conferences. As a result, the so-called factual presentations at the public hearing became little more than a jockeying for vantage point, with each party at issue striving to establish an initial position from which it could make a maximum of concessions in post-hearing conferences and still emerge with all it deemed vital to its interests. In a very large number of cases, the so-called factual evidence presented was patently unsound and would not have received consideration in any court in the land. The NRA increasingly recognized the shallowness of these public hearings, and deputy administrators in perfunctory fashion allowed evidence to be inserted in the record which they knew to be unworthy of respect. Effective cross-examination would have delayed proceedings and revealed the bitterness of disagreement between the various boards within the NRA itself. Factfinding hearings had degenerated to the level of "speaking for the record."

No coordinated code structure

Codes finally took form amidst the clash of conflicting interests in the post-hearing conferences. Created in an environment of compromises dictated by the relative bargaining strength of labor and industry, and shaped with varying degrees of governmental pressure, they emerged as individual entities and not as carefully welded parts of a coordinated code structure. Too frequently the factual basis was weak, as time considerations forced reliance upon sheer guesswork. Intercode difficulties and conflicts were inevitable. The deputy administrator, facing a task verging upon the impossible, had merely done the best he could—occasionally dominating, often dominated by, the situation with which he was confronted.

It would be inaccurate to term the result a system of codes for American industry. The very word "system" implies orderliness and cohesion, a combination according to some rational principle. NRA had developed during the process of codification no clearly defined policies resting upon economic analysis and factual foundation on key controversial points of vital importance such as pricing, limitations on production through quotas or machine-hour restrictions, wage differentials as between the North and South, similar differentials between small towns and large cities; and no underlying philosophy controlling distinctions to be made between industries producing and those distributing goods. These are but typical of the problems solved for the moment by inspiration and negotiation. Certain rule-of-thumb formulas were, it is true, gradually adopted as a matter of sheer necessity in order to provide a procedure applicable to the most frequently recurring problems. Provisions based upon such formulas were frequently forced into codes in which they had no proper place, merely in order to conform to the latest edition of the so-called "model code" circulating at that moment within the NRA for the assistance of harassed deputy administrators.

Codes blocked recovery

If there were any logical unity running through NRA's codification, it would be possible to attempt general appraisal of the codes. No such unity ever existed. NRA, chameleon-like, is too variegated a body to be described as a system. Within the broad scope of codification can be found every economic doctrine known to man, both sound and unsound. Certain codes have been admirably drawn, are consistent with the public interest as well as industry interest, and probably represent contributions both to social reform and to recovery. Other codes are not only unsound but utterly incapable of enforcement.

In the last analysis, laws must depend for their sanction on the approval of the community. NRA codes in theory are laws of the land, but many of them have bred lawlessness, simply because in the eyes of those affected they have been neither sound economics, sound ethics, nor sound common sense.

It is difficult to escape the conclusion that the National Recovery Administration's codification of American industry has made no net contribution toward the President's "more abundant life." On net balance it has probably tended to restrict production through high costs and prices, and, by virtue of provisions in the codes relating to curtailment of output and prohibition of new equipment, has interfered with the free movement of private initiative and enterprise. Lack of any clear-cut administrative policy with respect to prices, production controls and labor relations, to cite but three instances, has left business in a state of continued uncertainty which has been intensified by vacillation in code enforcement.

Placing the responsibility

No honest critic can claim that either industry or labor has been free from blame for such weaknesses as exist in far too many codes. Industry, under pressure of forced wage increases that frequently resulted in an approximation of prosperity wage scales in the midst of a depression, sought to protect itself by obtaining so-called "fair" trade-practice provisions, which at times were inconsistent with the public welfare and inimical to recovery; and not infrequently time has proved the economic reasoning of industry unsound. Labor, not unnaturally, in the light of promises made and in the belief that prices and cost of living would advance rapidly toward 1926 levels, sought the protection of wage scales containing a contingent reserve of purchasing power.

The ultimate responsibility, however, was that of the Recovery Administration. It was the final arbiter. It had within its power the opportunity to demonstrate the ability of the government in the field of economic planning. Faced with an opportunity unequalled in the administrative branch of the government, an authority unhesitatingly used, and a responsibility for the welfare of the recovery program, it chose to violate every sound principle of economic planning, to sacrifice statesmanship for speed, and to substitute compromise and negotiation for principle and policy.

After June—what?

The National Industrial Recovery Act will expire by its own terms not later than June 16, 1935, and at that date there will have been no conclusive test of the possibility of codes of fair competition in American industry. This much seems clear: any legislation succeeding the present NRA should be of the same temporary emergency character as the original act and preferably limited to one year. Continuance of the experiment beyond such a date should be based upon demonstrated performance. Codification should be limited to voluntary codes submitted by industries and audited by the Administration from the viewpoint of the public interest. There should be a clear recognition that no centralized federal administrative body can successfully prescribe detailed regulations governing the operations of a multitude of industries and companies existing and functioning under widely varying conditions in all parts of the United States. Flexibility should be sought, rather than rigidity imposed.

An increase in national real income, obtainable only with a maximum production of goods, should be striven for rather than the impossible achievement of recovery through scarcity. Higher prices should result from the restoration of economic balance and through increased demand rather than through either limitations on output or new capital investment, or emphasis on wage rates carried to such levels that they result in smaller pay envelopes. The laborer is worthy of his hire; yet he lives not on wage rates but by the purchasing power of his pay envelopes.

In certain industries, essentially those dealing with wasting natural resources, conditions may legitimately require in the public interest a degree of control of volume or price to an extent seldom found elsewhere. Under such conditions, the definitely controlling principle

should be that the farther action of this character is approved, extending into fields otherwise restricted or prohibited by law, the greater the governmental supervision necessary.

Even now, it would be unfair to state that sound codification of American industry is impossible, or has failed. It has not yet been attempted. NRA's honest but mistaken decisions during the last half of 1933 have thus far precluded the attempt. What might have been accomplished under a National Industrial Recovery Act will never be known. What has been accomplished by *the* National Recovery Administration is on net balance a retardation of industrial recovery in the United States.

CODES AND CONSTRUCTION • • • 2

The First Year of the Code

OF THE THREE OBJECTIVES, integration of the industry through national representatives has been achieved, although the local phase of unification has been spotty - - - Improved labor relations - - - Area-agreement plan needs amendment - - - Compliance requires local aid.

S. F. VOORHEES
Chairman,
Construction Code Authority

ONE YEAR AGO the construction industry code had just received the President's approval. Months of discussion had preceded this step. Many separate groups engaged in construction had preferred independence to cooperation; numerous conflicts had developed between competing or overlapping groups; building and engineering construction had been at odds over their divergent requirements; labor was hostile to some essential elements of code structure. Not only had it seemed impossible to harmonize these differences, but, with the code finally agreed to and signed, it seemed little short of impossible to make it effective. Yet Chapter I of the code contained the simple statement, *"Effective March 2, 1934,"* and the code authorities were charged with the duty of assuring that it should become effective.

To what extent has this objective been realized in the past year's code adminstration, and what are the immediate trends and the future prospects? Construction, which should be the nation's greatest stabilizing force has hitherto been its most unstable element, the most susceptible to boom and depression. If it is ever to approach stability and perform its true constructive part in the nation's economic life, it must achieve that integration and cooperative action which the code for the first time makes possible.

If the code structure and its provisions are complete and fully effective then we need only concern ourselves with its continued operation. If, on the other hand, the present code is not a finished product and cannot be made fully effective, then the men of the industry have but two lines of action to follow: Either they must strive to abolish the code entirely, or they must amend it and then comply with it. In this connection two indisputable facts must be recognized—first, that the National Industrial Recovery Act is the law of the land; and second, that under this law the construction code is binding on every member of the industry.

The first alternative, abolition of the code, will occur automatically with the expiration of the act on June 16, 1935, unless the act in some form is extended by Congress. It seems certain now that such action will be taken. Further, the expressed desire of construction men is for the continuation of the code and a determination to make it work. Hence it is clear that the second alternative is the real line of action, and the Construction Code Authority is directing its efforts accordingly—i.e., to perfect the structure and the working provisions of the code as indicated by experience, and to bring about compliance.

● Construction had more at stake in the code system set up by the Recovery Act than the manufacturing or trading fields. It had the prospect of gaining unification, of converting a great, craft-conscious, sprawling industry, as Mr. Voorhees aptly calls it, into a compact, industry-conscious unit. With this, it had the task of improving its historically bad labor conditions. Are these prospects being realized? Mr. Voorhees, first called from his architect's table to lead the code fight and later made the head of the Construction Code Authority, answers that an excellent beginning has been made, that much work remains to be done, and that the men of the industry are able and willing to solve the code problem. —*Editor.*

The act declares the policy of Congress to be, among other purposes, ". . . to provide for the general welfare by promoting the organization of industry for the purpose of cooperative action among trade groups, to induce and maintain united action of labor and management under adequate governmental sanctions and supervision, to eliminate unfair competitive practices."

Provision for the first of these purposes—the integration and unification of the industry—was made in the definitions of the several chapters, in the administrative structure, and through the sponsorship of the code by the national professional and trade associations of the industry. It is a fact that nationally the industry is now integrated, although not completely so. It was not to be expected that complete organization could be accomplished in the short space of a year; that this great sprawling industry—reaching into every city, town and hamlet, highly individualistic and historically craft-conscious—could be welded into a compact, industry-conscious unit in so short a time. Nevertheless it is a fact that the representatives of the national organizations of the industry are thinking and acting in terms of the industry as a whole, not only in the Construction Code Authority but also in the divisional code authorities. Internally, more has been accomplished in the way of unification than had been hoped for.

Externally, the construction industry through this national integration has established for itself a recognized place in American industry. The code authorities, with the support of NRA, have successfully turned back many proposed encroachments by other industries on the legitimate field of construction; for example, the attempt to separate residential construction and to

combine it with another code. It has been able, through integration, to prevent inclusion of construction functions in manufacturing and producing codes. The Code Authority is now negotiating with code authorities of other industries to establish proper delineation of their respective functions. Progress has been slow, but recent decisions indicate the acceptance, eventually, of the fundamental premise that conditions of competition must be equal between members of the construction industry and members of other industries who produce construction equipment or materials and install them.

Many local difficulties remain

While the national phase has made much progress, the local phase of unification and integration has been spotty. In some localities excellent work is being done on an industry basis, while in other places there is either indifference or antagonism between the various groups.

Since last August a committee of the Construction Code Authority has been making a careful study of these conditions and preparing a plan for local integration, the Code Authority having recognized the fact that successful operation of the code must be based on effective local cooperation. Because of the importance and difficulty of designing such a scheme, the committee has retained two specialists in government in order to obtain an outside viewpoint of the problem and the advantage of other experience in self-government. The plan in its various stages of development has been approved from time to time by the Code Authority, and now it is proposed to put it into effect in one of the larger building centers as an experiment, and also to offer it for consideration by other communities. This will be the major activity of the code authorities in the matter of unification for the immediate future.

Labor and area agreements

A second purpose stated in the act is to provide for cooperative action by labor and management. The plan for this purpose provides for two major instrumentalities: one, mutual agreements between employers and employees by divisions and regions; and the other, the National Construction Planning and Adjustment Board, composed equally of employee and employer representatives. Experience in making the mutual, or so-called area agreements is somewhat limited because some of the divisional chapters of the code were not completed until late in the year and machinery had to be devised in each division to initiate and consummate such agreements. However, a start has been made, and a fair number of agreements have been approved by the President of the United States. Experience has shown that certain amendments are necessary, and these are now in course of adoption. Probably further amendment will be necessary, and procedure will be changed as further experience is gained.

The Planning and Adjustment Board is slowly and wisely making its way in a pioneer effort to bring about better industry relations in the industry. Its impartial chairman, Sullivan W. Jones, appointed by the President, is giving his full time to this work, most effectively. The relations between the employer and employee representatives on the Planning and Adjustment Board are excellent, and a real step in advance has been made from the summer of 1933, when the Construction League of the United States and the American Federation of Labor were in violent opposition over the code and little or no constructive discussion could take place. Now, even though agreement may not always be reached, there is a place where problems of mutual interest to employers and employees can be discussed.

The problem of fair trade practice

A third purpose of the act is to eliminate unfair competitive practices covered by provisions in the several chapters having to do with competitive biding practices and other employer relations. There are no price-fixing provisions in the code, unless the provision against selling below cost is so considered. It is not to be denied that there is in certain localities much dissatisfaction with the trade-practice provisions, that in many cases they are not observed by federal bureaus, and many members of the industry doubt their wisdom. On the other hand, in many localities and in some divisions of the industry, trade-practice provisions are quite satisfactory and are being complied with.

In this field also, much development work is required. The Construction Code Authority has authorized a special committee to study the subject. It is believed that the local code groups or councils, when organized, will be most effective in finding the solutions for some of the trade-practice difficulties.

An excellent beginning made

In conclusion, it can be said that an excellent beginning has been made in the application of the construction code in the field. But it must also be emphasized that only a beginning has been made, that this effort is a pioneer one, that there is no experience either in industry or in NRA to draw upon, that the intent of the code is misunderstood, and many well-meaning members of the industry are experiencing trouble because of misunderstanding, and that there are members of the industry who are diligently searching for ways of evading the code.

All of these things are met with in any experimentation. Code problems can be solved by the members of the industry because they have the skill, the sincerity and the patience, born of their life in the industry, and I am convinced that they have the will to do so.

CODES FOR CONSTRUCTION

● **Some of the many codes that affect the various elements of the construction industry are listed below.**

Construction Industry Codes:

- Construction as a whole
- General contracting
- Painting, paperhanging and decorating
- Elevator manufacturing
- Cement gun
- Electrical contractors
- Roofing and sheet-metal contractors
- Mason contractors
- Tile contracting
- Plumbing contracting
- Wood-flooring contracting
- Resilient-flooring contracting
- Kalamein
- Insulation contractors
- Heating, piping and air-conditioning
- Terrazzo and mosaic
- Marble contracting
- Plastering and lathing
- Building granite contractors
- Stone-setting contractors
- Construction news service
- Wrecking and Salvaging
- River and Harbor Improvement
- Bituminous-Road Material Distributing

Construction Equipment Codes:

- Road-machinery
- Rock-crushers
- Shovels, draglines and cranes

A Few of the Materials Codes:

- Lumber
- Iron and steel
- Lime
- Terra cotta
- Crushed stone, sand and gravel and slag
- Limestone
- Structural clay products
- Reinforcing-materials fabricating
- Cement
- Concrete masonry
- Vitrified-clay sewer-pipe manufacturing
- Waterproofing, etc.
- Concrete-pipe manufacturing
- Slate
- Metal lath manufacturing
- Clay-drain tile manufacturing
- Sand-lime brick
- Gypsum

Some Related Codes:

- Construction-machinery distributing
- Trucking
- Ready-mix concrete
- Builders' supply trade
- Retail lumber, etc.

CODES AND CONSTRUCTION • • • 3

Contracting Under the Code

GENERAL CONTRACTORS although finding fault with the administration of their code still want it maintained and greatly strengthened - - - Unfair competition by government day labor is a major problem - - - Outlook brightened by new set-up of NRA compliance machinery.

A. E. HORST
Chairman, Divisional Code Authority for General Contractors

THE establishment of the code of fair competition for general contracting (effective March 19, 1934) created a new condition in the industry. Sponsored by the recognized national trade association for general contractors and formulated by members of the industry representative of all branches and of all sections of the country and of both large and small operators, it is in substance the familiar code of ethical practice—but now for the first time a code with the force and effect of federal law.

Numerous obstacles which had to be overcome postponed the effective date of operation of the code to approximately Sept. 1, 1934. In the interim many policies were still in the experimental stage, both in NRA and in code authority administration. Under such circumstances, most general contractors have not yet become aware of the applicability of the provisions of the code to their respective business and operations.

Education and enforcement

First of all, an educational program was necessary, both for proper administration of the code and for application of its potential benefits to members of the industry. A joint preliminary survey in the western half of the country, just completed by the executive manager of the Divisional Code Authority for General Contractors and the deputy administrator of the construction division of NRA, shows conclusively that an educational program of much greater magnitude than heretofore contemplated is necessary.

In the second place, experience with the code brings wide-spread insistence that the code be maintained, both as to principle and as to practice, but that enforcement be promptly and drastically strengthened. Many contractors who have been complying with the provisions of the code have found themselves penalized by their very compliance, even to the extent of losing contracts because of scrupulous observance of the provision forbidding receipt of sub-bids during the 24-hour period prior to the filing of their general bids. Such a situation unrectified would be serious; but the code provides all of the machinery by which rectification can be made.

Voluntary compliance with a code can be depended upon only so long as members of the industry are not seriously penalized by the continuation of unfair trade practices on the part of their competitors. However, the administration of the code and the application of its provisions to general contractors is an entirely new enterprise, without legal or economic precedent. It must be recognized, therefore, that until enforcement agencies of the federal government are reasonably sure of the legal ground upon which they must base prosecutions, such prosecutions must be deferred. Hurriedly prosecuting a case upon questionable ground might even jeopardize the legal status of the entire code. The Code Authority for General Contractors, and those general contractors who have thought things through, are wholly aware that administration of the code to date is far from satisfactory.

As to registration fees

A third result of experience to date with the administration of the general contractors' code has to do with the registration of work and the payment of registration fees. It cannot be seriously denied that the consuming public, which embraces the entire population of the country, must pay whatever price for recovery the state of the nation requires. This being so, general contractors, in paying registration fees to their code authority for work undertaken or services contracted for, should already have provided in their costs for the registration fee. The code of fair competition for the general contracting industry is intended to produce conditions of stability in the industry. This done, not only employers and employees in the general contracting field but also the consuming and investing public will be so greatly benefited that the registration fee becomes, in effect, a negligible insurance premium for securing and maintaining stable competitive conditions and stable investment and capital values.

New problems

A serious problem facing the general contractor because of code restrictions upon the operation of his business has to do with two new kinds of competition.

The first of these is what is known as government competition, which general term designates the countless ways in which departments of the federal government, state, county and municipal governments either take deliberate advantage of provisions in the law or in the codes and do work by day labor which should properly be done by private contract; or, through ignorance of the purpose of the codes, set up differentials in favor of public agencies and against the general contracting industry, which in the end penalize the entire public. Work is done by day labor at wages less than the wages which general contractors are required under the code to pay, and with working hours longer than the maximum working hours permitted in a general contractor's operations. It is recognized that, for specific projects, competent governmental authority may set up wage and hour provisions upon which basis general contractors may compete on a parity with public agencies, but this exemptive privilege is not made available to general contractors when a public agency performs work by day labor with its own forces. The day-labor problem was bad enough, both for the public and for the general contracting industry, before the existence of a code for general contractors; it is now immeasurably worse.

The second arises from the disparity of wage and hour provisions between the contracting industry code and the codes for other industries. If a manufacturing industry, with a code which permits a minimum common labor wage of 25c. an hour, has construction work to be done and claims the right—a claim which is denied by the Code Authority for General Contractors with the com-

plete support of NRA—to have that work done under the code for its own industry, general contractors with a code minimum of 40c. an hour would be forced completely out of this market. Such competition is not only unfair competition but tends to intensify the very evil that the recovery program itself purposes to eliminate—unemployment.

The recent dividing of the compliance division of NRA into ten zones was for the purpose of distributing and localizing its coordination with the code authority administration, and will materially shorten the procedure of securing compliance and enforcement.

It has been the experience of the Code Authority for General Contractors that individual members of the industry have been reluctant either to report known violations of the code or to make complaints or ask for investigation when they had reason to believe that a violation had occurred. This reluctance seems to have been due to a juvenile sense of sportsmanship, and entirely overlooks the fact that a competitor who violates a provision of the code is, in effect, putting his hand into the pockets of those competitors who are complying with the code and taking out their money for his use. This violator should be looked upon in a sentimental light.

The outlook is for continuing controversies because of disparity of competition between general contractors and public agencies and between the general contracting industry and other industries. Such controversies, however, can be dissipated if the parties thereto meet the problems in an honest, intelligent and courageous spirit and with a proper sense of duty to the public.

Controversies arising out of permanently conflicting interests within the construction industry will continue so long as such conflicting interests exist. It is the duty of the several divisions of the construction industry to compose their differences and settle their controversies within the industry. It will not do for general contractors to stand aside and be satisfied with permitting the vagaries of human nature and the drastic effects of what is loosely called the law of supply and demand to operate without intelligent control. It should not be necessary to go through another lesson to learn the harm that a laissez-faire policy will do.

Intelligent patience is required for a proper understanding of the code. The evils and vicious practices of a half century cannot be rectified in a short time, and the codes have not yet even begun to have a fair trial. Immediate administrative difficulties are not to be looked upon as obstacles to a steadfast, evolutionary program in code administration and application.

The problems in the foreground must not be allowed to obstruct a view of the long-range objectives. It will be well to remember that the constitution of the United States not only took years in the making but is still subject to evolutionary interpretation as national problems arise and national policies require adoption.

Experience of ten months of administration of the code and observations made in a recent survey of the western half of the country convince the thinking contractor that his industry will not go back to the destructive competition preceding the collapse of 1929. Rather, his industry will best serve and be served by conforming to the provisions of the code of fair competition for general contractors.

CODES AND CONSTRUCTION • • • 4

The Subcontractor's Code Problems

DIVERSITY of subcontractors' services, between such extremes as 90 per cent labor on the one hand and 90 per cent material on the other, has made the first year's code efforts difficult, but the outlook is promising because of improved cooperation from NRA, of intercode agreements on jurisdiction, of use of skilled-wage rates, and of stronger local compliance aids.

GORDON P. MARSHALL
Subcontractor Member, Construction Code Authority

ANY APPROACH to the question of code problems and experiences in the subcontracting field must indicate first the relationships between the subcontracting groups and other divisions of construction; and then the differences between various elements among the subcontractors themselves.

The construction code covers three separate functions: design, general contracting and subcontracting. These three fundamental groups act variously as buyer or seller. Subcontractors are essentially sellers; general contractors are both buyers and sellers; and the members of the design group, as agents or otherwise, represent buyers. Codes are fundamentally designed to protect, within limits, members inside a particular industry against each other in their relations to buyers; thus the seller wants his code because of its protection, and the buyer conversely dislikes it. The existence of this buyer-seller relationship under one code is at the heart of many of the subcontractors' problems.

At the present time divisional codes in the subcontracting field cover painting, paperhanging, decorating, elevator manufacturing, cement-gun contracting, electrical contracting, roofing and sheet-metal contracting, mason contracting, tile contracting, plumbing, kalamein, wood flooring, resilient flooring, insulation, terrazzo and mosaic, heating, piping and air-conditioning, marble contracting, plastering and lathing, stone-setting and building granite.

Inside the subcontractor groups there are certain major differences. The products of some run as high as 90 per cent material, others 90 per cent labor. Some do a substantial proportion of their work in the shop, others all at the site. Some are confined solely to new construction, while others are deeply involved in maintenance and repairs, which complicates them with questions of jurisdiction and of owner compliance.

In the drafting of codes, responsibility fell mainly on trade associations, many of them greatly weakened by their struggle for existence during three years of severely declining business. Trade-association committees were told to write codes of fair competition for industrial self-government. The opportunity for effectuating codes of ethics, which for years had been the associations' ultimate aim, was suddenly handed to them.

Unfortunately, many of the associations were not able to grasp fully the

tremendous significance and responsibility of this undertaking. However, they did their best, gave unceasingly of their energy and time, to write laws incorporating codes of ethics, and then went farther to give their industry what advantages they could in relation to others. The National Recovery Administration could help very little; it was without experience, it had no precedent, and changed its regulations and requirements constantly. Only one thing was clear: that the codes should be written in the shortest possible time. Labor did what it could to further its aims in the code-making. Under these circumstances there is little wonder that lack of coordination resulted in many voids and overlaps and that excessive zeal wrote into codes many unenforceable or questionable provisions.

Important revisions under way

The remedies for the resulting situation, happily, are already in course of application. Thus: Chapter 1, covering the entire industry, is *functional* in its definition and conceded to be substantially all-inclusive of construction. But eleven of the subcontractor chapters have *contractual* definitions, leaving outside their scope all work not done for hire. Such a void was an invitation to many to remain outside the obligations of fair competition. Amendments are in process of formulation to make all subcontractor definitions functional.

Again, labor is coming to realize that if codes are to be effective in all parts of the country, more consideration must be given to special situations. Code authorities are examining their codes to simplify and strengthen them by eliminating unenforceable provisions, and by studying and testing those provisions on which there is neither common agreement nor court precedent.

Administrative difficulties

The next problem was to set up administrative organizations and to educate the members of industry in compliance. Each subcontractor group has its Code Authority—but with this one common feature their similarity ends. Two code authorities deal directly with their industry, one through state agencies, another through regional, state and local agencies, others through regional and local, and still others directly with local agencies.

The earliest subcontractor administrative organization started to function in April; others followed along one by one through summer, fall and winter of 1934, and some are not yet in full operation. Nearly all the personnel of these organizations serves with little or no compensation.

Thus far there has been little cooperation between the local or regional groups of different trades. Machinery for dealing with violations involving two trades has not been adequately developed. Lack of funds has been a serious handicap. While funds must of necessity be the result of local activity, the heavy expenses of setting up the central organization and then the branch agencies had to be met as organization proceeded, greatly retarding its ultimate completion. The local administrative committees, including the important fair-trade-practice-complaints committee, more often than not are made up of direct competitors.

Gradually, these difficulties are being overcome. Soon all the administrative agencies will have been set up and functioning, so that for the first time will be felt the full effect of the weight of the complete organizations of all trades. As more and more people are becoming acquainted with the benefits of fair competition, and realize the insignificant relative expense to bring about and maintain it, contributions are improving. NRA has indicated much-improved cooperation in making assessments effective. Of major importance is the growing realization that administration, to be effective, must be principally local, and that every effort must be made to develop and strengthen local agencies.

"Chapter I is functional in its definition, but eleven of the subcontractor chapters have contractual definitions, leaving outside their scope all work not done for hire. Amendments are in process of formulation to make all subcontractor definitions functional. Code authorities are examining their codes to simplify and strengthen them."

"A survey of sentiment in the subcontractor groups indicates that, although many changes are being made to improve and refine both codes and their administration, the fundamental idea of fair competition by codes to bring about recovery is acceptable and will go forward."

GORDON P. MARSHALL.

If the substance of the subcontractor codes is examined, certain things of special interest appear. Those codes that cover maintenance work come into sharp conflict with many outside codes whose industry members desire, for one reason or other, to do construction work under their own codes. Three codes contain the so called PWA rates for skilled labor; one contains a national minimum; all others depend for minimum rates of skilled labor on approved local or regional agreements arrived at by *bona fide* collective bargaining.

This latter method has been totally inadequate to date in producing the most fundamental necessity of fair competition—namely, minimum skilled-labor rates. Much enthusiasm and support for codes has been lost through failure in this respect.

Next to this, perhaps, the most important thing to subcontractors (the sellers) are the bidding-practice provisions. When these become effective, subcontractors will have that protection against each other which, while not eliminating competition, will put an end to chiseling and the playing of one sub against another, which results in a whole industry selling its services for so little so that no one benefits. To be effective, the bidding-practice provisions need strengthening, and bid depositories must be established blanketing the nation. Nearly all codes prohibit sales below cost although construction costs are very variable factors, and in spite of the difficulty of administering, all code authorities consider such provisions absolutely essential. Experience indicates that the fair-trade practices of the codes are generally acceptable.

Problems are being solved

These problems are being met in various ways. Conflicts on maintenance or jurisdiction are being ironed out by intercode agreements. Certain trades are attempting to introduce skilled rates by amendments. The NRA staff handling proposed wage agreements is functioning more efficiently. The Construction Code Authority is studying means of strengthening the bidding-practice provisions and is in the process of setting up joint bid depositories throughout the country. Code authorities are working out improved methods for checking sales below cost.

The difficulty of administering codes under constantly changing NRA regulations and inadequate cooperation from government on compliance, as well as the fact that an enormous amount of work is exempt from codes either by regulation or specific exemption, and the further fact that future legislation as to NRA is not yet clear, are problems of the whole industry.

Altogether, the outlook from the subcontractor's viewpoint is promising. The completion of code writing and organization, the improvement in cooperation from NRA, the ironing out of conflicts of scope and jurisdiction, the concentration on local administration, the trend toward joint administrative facilities, the improvement in contributions, the increasing effort to establish minimum wages, the strengthening of the bidding-practice provisions and the trend toward simplifying codes, encourage the hope that rapid progress will be made toward the goal of fair competition. A survey of sentiment in the subcontractor groups indicates that, although many changes may be necessary and are being made to improve and refine both codes and their administration, the fundamental idea of fair competition by codes to bring about recovery is acceptable and will go forward.

CODES AND CONSTRUCTION • • • 5

Engineers and the Code System

IMPERFECT though it is, the construction code furnishes a substantial start toward a unified industry, and it now binds employing engineers although the special engineering chapter still awaits final action - - - Operation of the architects' code chapter is awaited with great interest.

CARLTON PROCTOR

Chairman, Engineers' Code Committee, American Society of Civil Engineers

SINCE early March, 1934, employing engineers have been under NRA code self-government. Though many engineers did not realize the fact, they became subject to the Code of Fair Competition for the Construction Industry at the moment it went into effect, on March 2, 1934. Chapter I of that code, which was drawn with the help and indeed under the leadership of engineers' representatives, establishes general working conditions and fair practices which apply to them as fully as to contractors and subcontractors. The subdivisional chapter for engineers, which was drafted to establish additional provisions for engineers alone, has not yet been approved, though it has been before NRA for now nearly ten months. But this delay in no way diminishes the responsibility of those professional engineers who operate as employers in designing or planning works of construction to the cause of code self-government. Furthermore, regardless of differences of opinion as to the merits of the NRA system; of differences of opinion as to whether or not the two professions of the construction industry—architecture and engineering — should place themselves under an NRA code; and regardless of conflicting attitudes as to the values which have grown and may grow out of a codified contruction industry or as to the permanency of its codes, there can be no honest difference of opinion as to the value of unity and coordination of construction.

It is undeniably true that, despite many previous efforts aimed toward coordination, the construction industry has been so highly intra-competitive and disjointed as to lay itself open to the indictment by many able economists that it must share in responsibility for the economic depression, because of uncontrolled inflation of construction prior to 1930. In contrast, we have today, for the first time in the history of construction, the foundation and structure for a unified, coordinated industry.

When we acknowledge the advantages and values of an integrated industry, we must recognize at the same time the essential rôle which has been and will continue to be played by the architects and engineers.

None but the professional attitude was acceptable to the other component branches of the industry as capable of rendering unbiased and fair decision on the jurisdictional and intra-industry disputes that continuously arise. Acceptance of the professional opinion and judgment alone prevented many deadlocks between the several branches of the industry.

The creation of NRA immediately brought to light the confusion and conflict of interest then obtaining in construction. At an early date farsighted members of the NRA organization perceived that no rehabilitation of the industry was possible unless first a broad industrial consciousness and unity of interest were created through industry integration. The selection of the Construction League of the United States as the coordinating agency quickly resulted in clear definition of the responsibilities for sponsorship and guiding action which must be accepted by the two professions if they were to become in fact, as they logically should be, the essential coordinating factors of the industry. The fact that the American Society of Civil Engineers immediately accepted this challenge and signified its sponsorship of a single construction industry code calls for the gratitude of every engineer within the industry, as this action by the society completed the foundation on which could be built the basic essential improvements and readjustments in industry conditions, and provided for the subsequent benefits to the engineer and the protection of his interests in this codified industry.

● Professional activities are not a normal part of the NRA system. Only a few professions have organized under codes. From the first beginnings of effort to frame a code for the construction industry, however, architects and consulting engineers concerned in construction appreciated the necessity for taking part in the integration of the industry. General contractors had recognized their duty to draft a code even before passage of the Recovery Act; but the broader view of bringing the construction industry together s o o n emerged, and here the professional element was seen to be an essential part.

● When the controlling first chapter of the construction code took effect, last March, engineers officially entered into code self-government of the industry. Their own supplementary chapter has not yet been approved, but as Mr. Proctor points out, they are under the full scope of Chapter I.

—Editor.

Engineers in unique position

Today the engineer stands the recipient of NRA benefits and protection by virtue of three facts: *first*, the inclusion in Chapter I of the Construction Industry Code of the American Society of Civil Engineers as sponsor of this code: *second*, the representation of the American Society of Civil Engineers on the Construction Code Authority; and *third*, the specific inclusion of engineering in Chapter I under definition of the construction industry. In addition, his position under the construction code is further protected by the fact that the chapter which is to be the supplementary engineers' code has been before the NRA for consideration and decision in its present form since the 26th of last April.

One of the reasons for delay in approval of the engineers' code is the fact that immediately after the present draft was agreed to with the NRA administrators and filed with them for action,

it became evident that many changes in code policy, administration and application were contemplated by the President. Not long thereafter certain inevitable questions arose within the Construction Industry Code for decision, the most important of which, from the engineer's standpoint, was the question of control and administration of the performance of such organizations as include in their normal practice the functions defined under two or more construction code chapters.

Other more serious questions now challenge the success of nearly two years of continuous effort. So long as the present arbitrary action of federal agencies continues, so long as they promulgate rate schedules and other mandates without regard to code requirements, so long as wages and construction-control provisions continue to be dictated solely by labor demands without balancing considerations of industry interests, there can be no revivification or permanent integration of the construction industry.

These and other equally controlling questions must be settled. In the meantime the architects have been continuously and actively pressing for their code chapter. Their finally accepted and approved draft is expected to be signed soon, and the engineers' code committee expects to benefit from the architects' operating experience.

In the interim, however, the position of the engineer in the construction industry, particularly as regards functional competitive inroads by other branches of the industry, is protected and will continue to be protected through his participation and inclusion in Chapter I and through the engineers' code draft on file with NRA.

CODES AND CONSTRUCTION • • • 6

Toward Better Labor Relations

CODE SELF-GOVERNMENT through the Planning and Adjustment Board holds promise of establishing a new philosophy of employer-employee relationships in the construction industry. First attention is being given to eliminating the indefensible jurisdictional dispute, to wage classifications, and to settlement of disputes through regional boards of contractors and workers.

SULLIVAN W. JONES
Chairman, National Construction Planning and Adjustment Board

INTO nearly every discussion of the construction code there stealthily creep two questions—Can the code be made to work?—Should the code be abandoned?

Sometimes these questions reflect wishful thinking; and sometimes they express a genuine skepticism which feeds upon a narrow experience. This is not a day of miracles. Not even a code can overnight impart vision and enlightenment to the millions comprising the construction industry. History and progress are recorded in construction. Always construction has led the procession in response to the driving power of pride in achievement. Understanding of the opportunities for further progress which the code presents insures its success.

To me, the one compelling reason why the code will work is that it offers for the first time in history real hope for sound labor relations in construction. And by that I mean nothing less than that through its operation we shall erase from this proud, self-reliant industry the last remnant of the heritage from the master and slave relationship, and release the thrust of cooperative action by free citizens in promoting the general welfare.

It seems perfectly clear, as Mr. Voorhees points out, that we shall have codes for at least another year after June 16. The construction code is not a static rigid framework of laws to be clapped on the industry like a straitjacket. It bears no color of dogmatism. It is a piece of machinery, and like most first models, it will go through a period of evolution and simplification. I cannot conceive of the code as ever being a finished product. It was designed out of past experience. It will be modified as we learn wisdom from new experience. Already it has been amended, not just because someone wanted to tinker with it, but because some of the original provisions were found to obstruct procedures and restrict practices that seemed to be advantageous. There will be other amendments—many of them.

The code must live

No matter what Congress ultimately may do with the Recovery Act, the code must live. The code does not need the sanction of the Recovery Act. It cloaks no tendency to monopoly or restraint of trade. The fact is that the code will be supported as the magna charta of a great, venerable and indispensable industry gathering unity, vitality and strength from integration.

How can the industry successfully cope with the problems of self-preservation now crowding in upon it without the code which implements and makes effective the unity, strength and ability to think and plan? The times are crucial. The future course of events is far from clear. The position of the construction industry is peculiarly vulnerable because of the very nature of its function in satisfying numberless human wants everywhere. It is a convenient and inviting tool for use in furnishing employment for a horde of buttonhole makers, pants pressers and dishwashers who have been squeezed out of their own normal occupations, not to mention the "bums" who have been relieved of the necessity of filching a bare existence at the housewives' backdoor by being maintained at the public's expense.

The future drift of the construction industry seems to me likely to be in one of three general directions: toward self-regulation; toward nationalization or rigid control by government; or toward chaos. If the industry has the will, it can make the choice. Certainly it has the intelligence and the capacity for cooperation. The code furnishes the machinery for action.

Enlightened labor policy

The spread and strengthening of labor organization under the discipline of statesmanlike leadership, guided by the sound American concept of the mutuality of interests between employers

and employees, is the bulwark against chaos. Unions may serve as agencies for peace and progress as well as for strife and destruction. "The only difference between stumbling blocks and stepping stones is how we use them."

Close cooperation between organized employers and organized employees is the antidote for the paralyzing touch of government control. In unity lies the seed of future industrial peace, progress and prosperity.

The code has afforded the industry an opportunity to examine the scars it carries as reminders of past struggles between employers and employees and between the organizations of employees. It is not a record of which the industry has reason to be proud. The loss in money, in lives and in property, when totaled, is an appalling price to have paid for the gains made. If the curtain is not now dropped upon that unhappy record as belonging to a dead past, the industry will have to assume the full responsibility.

A new agency for progress

In the Planning and Adjustment Board the industry has established the means of changing the whole philosophy of employer-employee relationships in the construction industry. As well as being the pound of cure, the board also is the ounce of prevention. Never before has there been in the construction industry an agency charged with the responsibility for promoting harmony and cooperation between employers and employees as a substitute for the traditional seat on the keg of powder.

The Planning and Adjustment Board symbolizes the dawn of a new era in which the members of industry will recognize their individual and collective social responsibilities and will understand that to persist in demanding the right to do as one pleases will lead to suicide just as surely as driving at 60 miles an hour on the left-hand side of a crowded thoroughfare will bring the driver to an untimely end, even though he may assume that as a free individual he has the right to disregard the regulations adopted for the safety of all.

The Planning and Adjustment Board has been working quietly to get its feet firmly placed on solid ground from which to go forward. Naturally, it has given first attention to the recurring causes of strife with which past experience has made us all familiar.

Some current problems

The indefensible jurisdictional dispute has been under diagnosis by the labor members of the board. They have accepted this as their problem. Real progress toward a solution has been made.

In the past every wage adjustment has been an inviting fuse leading to the keg of powder. The code provision for area agreements is based upon the sound theory that the terms upon which one man sells his services to another calls for a meeting of minds. In application the theory has run into difficulties. The planning and adjustment board is working to clear the road. It is formulating a plan which will involve some minor amendments to the code. The board's plan seeks to establish, through the area agreement, a real industrial democracy in which is recognized the right to local self-determination.

The board has questioned the soundness of the principle of adjusting the wage to the cost of living. The depression has disclosed the fact that the cost of living tends to adjust itself to the average wage paid. Unless industry itself produces purchasing power as well as goods, and in sufficient amount to provide for the consumption of its product, industry can pay no dividends, and the investment in plant becomes worthless. Realizing this, the board has initiated a research, under the sponsorship of the Brookings Institution, to determine, if possible, the relationship of wages to purchasing power which will be required to maintain a balance between production and consumption at the level required for any desirable standard of living.

Disputes between employers and employees will never be completely eliminated. But any controversy can be adjusted by reasonable human beings, especially if they understand that their interests are best served by adjustment. Proceeding from this premise, the planning and adjustment board is developing a plan for the settlement of labor disputes through the establishment of regional planning and adjustment boards, which will serve as agencies for conciliation and mediation. Following the consent of the parties to a dispute, the regional boards may make a final determination. These regional boards also, in the absence of other agencies, will in cooperation with the NRA compliance machinery handle complaints on violations of wage scales and hours of work.

The board has a committee at work on classification. No wage structure will have real stability unless and until it rests upon a workable and acceptable classification of occupations. A stable wage scale is as important to the employer in the construction industry as it is to labor because without it there can be no bidding parity.

There are, of course, other problems now rising above the board's horizon. With its eyes and mind definitely focused on the future, these problems will be considered as the board moves forward. A mere reference to some of them is all that space will allow.

One of the most important of these problems arises from the intermittency of employment in the construction industry. Security and regularity of employment must be substituted for uncertainty and irregularity. The natural tendency is toward security and continuity of employment, especially on heavy and open construction. It is highly beneficial to employers, employees and the public. Perhaps the answer, in the more populous districts anyway, lies in "pooling" employees and employment with suitable collective guaranty.

Another problem, which is assuming urgent importance, is the necessity of prequalifying workers for employment on construction. The core of this problem is apprenticeship training. There is a growing need for a national program. The work to be done calls for the closest organized cooperation between employers and employees.

Dawn of a partnership

Throughout the negotiations for the code under NRA, labor in the construction industry contended, perhaps without knowing it, for a partnership with management in the industry. Those labor leaders who were contending for representation in the councils of the industry are beginning to realize that with such a relationship there go certain responsibilities. Perhaps it is not too much to hope that labor some day will openly declare not only its willingness but its desire to assume the responsibilities of partnership. Such a relationship, it seems to me, is of growing importance. Certainly it assumes the position of paramount importance if industry is to be self-governing.

● **Unique in its structure, the construction industry is unique also in the noteworthy agency set up under its code to study and improve the relations between employer and employee—the National Construction Planning and Adjustment Board. Ten employer representatives, ten labor representatives, and Sullivan W. Jones, architect, as neutral chairman, make up this board. It has little power; it can decide disputes only on request of both parties; but in the last analysis it is, as Mr. Jones characterizes it, "the bulwark against chaos" in the construction industry. Elimination of jurisdictional disputes, promotion of area agreements on wage and working conditions—and finally, no doubt, increase in the construction worker's load factor to give him a high income at moderate daily wages—are objectives. Stabilization is the broad aim of the board's work. Inauguration of its work is one of the great events of 1934.**

—Editor.

Resources Study Begun

THE NATIONAL RESOURCES BOARD begins taking an inventory of land, water and mineral resources of the nation as the groundwork of a plan for their logical and coordinated development and use - - - Initial report outlines some general policies that should be adopted.

By CHARLES W. ELIOT 2nd
Executive Officer, National Resources Board

"OUR national resources are the heritage of the whole nation and should be conserved and utilized for the benefit of all our people." These words of the recent report of the National Resources Board express the concept back of the great movement initiated during the past year, the movement for inventory and study of our resources as the basis on which improvement programs and policies must rest.

On the broad premise of the common public interest in our physical assets, the National Resources Board, for the first time in the nation's history, set out to make an inventory of our national assets and of the problems related thereto. For the first time, also, it drew together the foresight of the various planning agencies of the federal government and suggested methods for future cooperation.

A year and a half ago national planning was regarded by some as a bogey, by others as a cure-all. Those of us who have been working with the National Planning Board and the National Resources Board have regarded it as a challenge. The board's report is an example of national planning that grows logically and naturally out of our engineering and conservation experience.

A year and a half ago, Secretary Harold L. Ickes, as Administrator of Public Works, set up the National Planning Board in the Public Works Administration, consisting of Frederic A. Delano, Dr. Charles E. Merriam, and Dr. Wesley C. Mitchell. That board undertook four major jobs—first, the stimulation of state and local planning; second, a specific research into public-works planning; third, efforts to develop a method of coordination among planning agencies of the government, and finally, the preparation of "A Plan for a Plan." The report of the board, now published as a public document, was submitted to the President last June. It contains a full statement of the proposed plan for planning.

When the report of the National Planning Board was submitted to the President, he requested the same group, with the addition of five Cabinet officers and the Administrator of Federal Emergency Relief, to continue the work with specific reference to land, water and mineral resources under the name of the National Resources Board.

After six months' intensive effort, the report of the National Resources Board has been given to the country and now awaits the action of Congress to implement or reject the major proposals recommended to the President. The program outlined therein may be expected, if carried through, to:

1. Provide for the systematic development of our water resources for purposes of sanitation, power, industrial uses, transportation, recreation, domestic consumption, and other collateral uses on a far higher level than ever before.
2. Remove the recurring menace of great floods and vast losses to persons and property.
3. End the heavy losses of soil caused by uncontrolled erosion.
4. Eliminate the use of land incapable of affording a minimum standard of living, develop agricultural production on the most suitable soils only, and aid in raising the standards of living in many agricultural regions.
5. End the wasteful use of our mineral resources and substitute a national policy of mineral conservation.
6. Make available large areas of land for purposes of popular recreation.
7. Assemble basic data in regard to mapping, public finance and population, necessary for national planning.
8. Avoid the extravagance caused by failure to coordinate public works—federal, state and local; bring about better programming of socially useful public works; prepare public-works projects suitable, if desired, for use in emergency situations.
9. Provide for continuous long-range planning of land, water and mineral resources in relation to each other and to the larger background of the social and economic life in which they are set.

It is, of course, idle to expect that the mere declaration of a set of policies will automatically produce results. As the board pointed out, legislation, administration, cooperation of many different types of governmental agencies and strongly supporting public opinion—all are necessary to bring about substantial changes of the kind just indicated. The use of natural resources is not a thing apart. It involves closely the whole mass of human activity with industry, labor, finance and taxation. If the planning leaves out of account many vital factors in our economic and social life, it is not planning at all. Our national policy aims to obtain very substantial gains in the nation's wealth and in the broad distribution of human welfare.

● We cannot determine what public-works projects should have priority until we are able to visualize each project as an element in an orderly program of development.

● The past year brought the first definite attempt to inventory natural resources for study, occasioned by absence of plans for federal public works which might have created employment in the 1933 emergency.

● In the accompanying article Charles W. Eliot 2nd, executive officer of the National Resources Board, sets forth in summary form what that board and its predecessor have done to lay the groundwork for the national and state planning that is yet to be begun. —*Editor.*

Organization

Three members of the former National Planning Board, previously named, were constituted an advisory committee of the National Resources Board; and that committee, in the preparation of the resources board's report, in effect, served as an executive or steering group. Use also was made of coordinating committees previously set up and several additional units. The land planning committee, for instance, employed a large section of the board's staff to prepare the material for the committee's action. Similarly in the water field, the former Mississippi Valley Committee was utilized as a water planning committee with a section of the staff assigned to that work. A third committee on mineral policy had already been set up by the President,

and a staff was assigned to that unit for the preparation of the mineral report. In the case of the mapping program, a slightly different arrangement was used because the Board of Surveys and Maps has had a long and honorable history and no new committee was necessary. It has submitted its report through the Resources Board instead of directly to the President.

Land

The land report reviews the probable growth of population during the next 25 or 50 years, and through an analysis of population data forecasts the stabilization of our population before 1965. Next, trends for the advance of industry and effects of mechanization on agricultural production are discussed in order to ascertain how much additional population may be cared for on the farms and how far improved methods of farming can concentrate production on areas already under the plow. The second part of the land report discusses the land requirements for different major uses, such as forestry, crops, grazing, recreation, wild life, etc., with indications of the present and prospective demand for lands in each category and the arguments supporting the estimate.

Finally, in the third part of the report, there is a statement of the necessary adjustment to provide for the needs of our probable population in the most efficient manner, with suggested policies to bring about these adjustments with the least interference with present trends in land uses.

With regard to land reclamation, the committee recommends the following policy, based on state participation:

1. Development of a plan based on technological and economic considerations.
2. No project to be undertaken until its economic feasibility or other necessity warranting its construction has been unquestionably demonstrated.
3. In case of expenditure of federal funds, there should be a national, as well as a regional, benefit; and not only farmers, but other individuals and communities benefited should be required to incur obligations commensurate with these benefits.
4. Such irrigation developments shall comprise an essential part of a national plan aimed at a proper coordination of the various major forms of land use.

Concerning recreational land requirements, the committee estimates that state and county park systems combined should be increased from the present 3,800,000 to as much as 10,000,000 acres.

Water

The water resources committee sets forth four major objectives:

1. To develop more productive uses of water, water supply, navigation, power, irrigation, recreation.
2. To eliminate, modify or neutralize harmful influences of water, such as floods and erosion.
3. To eliminate, modify or neutralize harmful handling of waters—pollution, waste through runoff and drainage.
4. To accomplish the above purposes effectively from the point of view of technology, geographical conditions, existing public agencies and the intelligent understanding of good-willed citizens.

Under the head of planning specific projects, the water planning committee recommends that studies be initiated promptly in a long series of instances, and always on the basis of the drainage basin as a whole.

The water committee has made two great contributions—first, the generalized study of the whole drainage basin, and second, the integration of studies for all water uses and abuses at one time instead of compartmental division of the field without interrelation.

The mineral planning committee rehearses again some of the awful instances of waste in our present method of handling these exhaustible resources and develops a series of policies aimed at the correction of some of the abuses and difficulties now being encountered.

Mapping

The Board of Surveys and Maps has recommended the early completion of a standard topographic map of the United States at federal expense. This proposal has been endorsed by the National Resources Board. The mapping project is estimated on the basis of a joint enterprise by the United States Geological Survey and the Coast and Geodetic Survey, and present estimates puts the cost of this mapping work at $117,000,000.

Public works for stabilization

The report of the board proper reviews the foregoing reports on natural resources and basic data and discusses at considerable length the use of public works as a stabilizing factor in economic depressions and the organization of a permanent Public Works Administration. Finally, it sets forth the work now going on under state planning agencies, and recommends a permanent national planning agency.

Much has been said in the press about a huge figure being recommended by the board for expenditure on public works. This figure of over $100,000,000 was found hidden in the discussion of the probable amount of public works that can be anticipated if conditions and trends of the last two decades continue for the next 25 years. Any such expenditure, or even a fraction of it, obviously calls for some more permanent organization for selection of worthwhile projects and for avoidance of old-fashioned "pork barrel" methods. The board's report suggests a method of organizing the public-works activities of the federal government through a permanent Public Works Administration. The basic idea behind the proposed organization is the preparation of a six-year program of public works for submission by the President and its adoption as a whole by Congress. The procedure would then be to secure a lump-sum appropriation for consideration in any one year, leaving the allocation of the appropriation to the permanent Public Works Administration, with the restriction that funds should go only to those projects included in the six-year program. Such a system would permit an appropriation to carry one-sixth of the six-year program or the whole of it, according to the economic situation in the country.

A permanent planning agency

Recommendation of the board for a permanent national planning agency is based on the idea that, first of all, national planning is the seeking out and seizing on critical points in national policy in a variety of different spheres, with a view to determining trends and possibilities before the situation gets to a point where action is prevented by preconceived notions or by unthinking emotional reactions. Second, national planning is the use of foresight based on hindsight so as to secure continuity in policy for the development of our human and natural resources. In the third place, national planning is the construction of a framework which can be kept in a flexible state but which at the same time may serve as a guide and basis for more detailed research and later action.

To carry on planning work of this sort, an independent agency working directly under the President is recommended. It would be the principal function of this agency to seek out critical points in the formulation of policy and to bring to the analysis of these problems not only the resources of the federal government but also those of private institutions and individuals. The second function of the government planning board would be the stimulation of state and local planning in order to secure that decentralization of work and interest that is essential to the life of any movement.

A foundation laid

As was stated in the opening paragraph, those of us who have been working with the National Planning Board and the National Resources Board look upon national planning not as a bogey or a cure-all but as a challenge. Progress in the preparation of the reports recently transmitted to the President indicates the many difficulties involved, but encouragement to go forward is found in the President's statement to Congress that "These documents constitute a remarkable foundation for what we hope will be the permanent policy for orderly development in every part of the United States."

Public Works and Recovery

THE PWA'S RECORD of cautious spending of only 1 billion dollars in eighteen months of the 2.5 billions allotted to construction proved an inadequate sparkplug for private business . . . Nevertheless, nearly 650,000,000 man-hours of direct employment were created as well as about 1,000,000,000 man-hours of factory employment, to aid the depressed durable-goods industries.

IRVIN D. FOOS
Engineering News-Record Correspondent

IN EIGHTEEN MONTHS the public-works program has produced 642,329,759 man-hours of direct employment at a cost of $1,063,303,024. This is the sum actually spent to date from allotments totaling $2,542,794,754 for federal and non-federal projects out of the $3,700,000,000 appropriated in 1933-34. The man-hours of labor created are equivalent to steady employment of 274,500 men on a 30-hour week during this 18-month period. The number actually on project payrolls reached a peak of 683,000 on Aug. 1, 1934, a year after the public-works program was initiated, when employment on federal projects, including TVA, totaled 541,000. Employment on non-federal projects reached a peak of 159,000 on Sept. 1 last year, and has remained practically stationary since that date. A slump in employment on federal projects to 250,000 brought the total figure down to 392,000 at the opening of 1935.

These figures do not include the secondary effects of public works. Average factory and field wage rates are not far above $20 per week on the 30-hour PWA basis, or somewhat above $1,000 per man-year. On this basis the eighteen-months' expenditure of $1,063,303,000 provided about 1,000,000 man-years of employment, direct plus indirect.

"Swift translation of the administration's plan into action, giving millions jobs, is our first objective," said Secretary of Interior Ickes on July 10, 1933, when he took on the job as Administrator of Public Works. Capacity for immediate employment was one of the criteria laid down in selecting projects, but this aim was obscured by a policy of extreme caution, which set up "merit and not push" as the determining factor. In the hands of an administrator who had highly resolved that there should be no pork, no graft, no scandal, the big program was slow in getting started and never gained momentum to deal the depression a real blow.

The original appropriation of $3,300,000,000 in 1933 for public works was no larger than the volume of public construction in 1930 and is small as compared with the pre-depression volume of private construction of $8,000,000,000 to $10,000,000,000. Obviously, the Roosevelt program could not close the gap caused by the decline in private construction to $2,000,000,000 a year.

More than this, the huge fund never was earmarked exclusively for construction. Statutory and executive allotments have cut off $1,166,067,166 for other purposes. Early in PWA's organization $400,000,000 was diverted to CWA, and $323,362,000 to the CCC. PWA is the banker for TVA to the extent of $50,000,000. The Farm Credit Administration has a drawing account for $100,000,000; NRA for $19,615,000; Surplus Relief Corp., $25,000,000; Export-Import Bank of Washington, $1,250,000; Electric Home and Farm Authority, $1,000,000; Federal Housing Administration, $1,000,000; and so on through a dozen other items which disclose that "public works" is a misnomer that includes many other New Deal activities.

● That construction is a powerful machine to counteract the wild unbalance of the swings of business had been studied—abstractly—for more than a decade before the paralyzing impact of the depression placed its call on the construction industry to avert the chaos resulting from mass unemployment. The first trial, the RFC, proved a thorough disappointment. Finally, the Public Works Administration was established in June, 1933, as the main energizer, to be assisted by the NRA reformation of industry. Its fund of more than three billion dollars has now been exhausted. What has been accomplished for recovery and for employment? Official records are brought together in the present answer.

—Editor.

While its ostensible goal was to promote business revival, the public-works program had an oppressive effect on private construction. The Recovery Act stipulated a 30-hour week maximum and early in his administration, Mr. Ickes reached an agreement with the American Federation of Labor for hourly wage rates of 40, 45 and 50c. for common labor, and $1, $1.10 and $1.20 for skilled labor in the South, Central and North respectively. Further demoralization resulted when the same rates were applied to the civil-works program last winter.

Physical results impressive

Failure of public works as an effective means of creating employment does not detract from the utilitarian and social benefits of the public improvements created. The PWA can appraise its achievement in the quality of hundreds of construction jobs that dot the map—waterworks, sewerage, schools, roads, streets, parks, libraries, power, light and heating plants, community centers, hospitals and the like.

Classified according to type, $279,800,541, or 29 per cent, of the total of $985,681,949 allotted for state, county and municipal projects as of Jan. 1 will be used for 1,741 utility plants or distribution systems (water, sewerage, electricity, gas); $215,899,808, or 22 per cent, for 1,531 buildings (schools, community centers, penal institutes, hospitals, city halls, etc.); $180,596,746, or 18 per cent, for engineering structures (bridges, tunnels, viaducts, etc.); $199,607,800, or 20 per cent, to railroads (rails and equipment); $51,566,760, or 5 per cent, for streets and highways; $47,716,924, or 4 per cent, for reclamation, water power and flood control; and $10,493,370, or 1 per cent, for navigation, airports, parks, etc.

Geographically, the distribution of funds for non-federal projects was lopsided; 74 per cent of the $985,000,000 total went to twelve states. But it is

important to remember that huge sums were handed out to other states for federal works, chiefly in the far West. Moreover, numerically the distribution of non-federal projects is much broader than on a money basis.

Of the non-federal allotments of $985,681,949 to Jan. 1, 1935, $699,688,987 is actually under contract or being done by force account. Money spent or deposited to the credit of applicants at Federal Reserve Banks totaled $317,699,137. PWA allotments amounting to $181,635,424 for 904 projects had been rescinded to Jan. 1.

Loan and grant totals

The federal government will recoup approximately $534,319,913 of the money so far allotted for non-federal projects (exclusive of railroad loans), as only 30 per cent of the cost of labor and materials is an outright grant. Many towns took grants only, borrowed the rest elsewhere, instead of paying PWA's rate of 4 per cent. Such grants total $94,502,038. Grants of $157,252,198 also have been made in conjunction with loans for $470,039,101. Loans only of $64,280,812 have been made for quasi-public and private projects. In addition, loan allotments to railroads total $199,607,800, all of which are repayable.

As of Nov. 30, 1934, PWA held $252,957,358 of securities in its portfolio, as follows: municipals, $118,559,778; railroads, $128,783,000; housing, $3,223,710; industrials, $1,757,400; miscellaneous, $633,470. Funds for allotment as loans to new projects are derived from the sale of these securities to the RFC, which, in turn, sells them on the market. The sale of 167 blocks of bonds that cost the PWA $43,512,009 has returned cash premiums amounting to $633,871.

Many federal projects

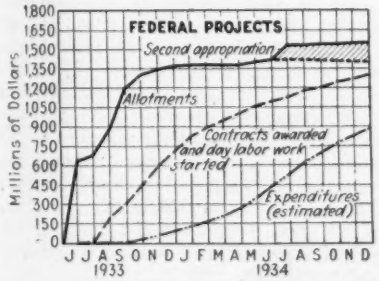
For several months after the public-works program was initiated, the bulk of allotments went to projects of the federal government. Much criticism ensued. But a good many federal jobs had been planned long before, and were ready to go as soon as the money was supplied. On the other hand, this was not the case with Fort Peck, Bonneville and Grand Coulee, nor with the battleship program, nor with federal buildings. In short, the defense of readiness that has been brought forward for the vast diversions to federal projects appears greatly overplayed.

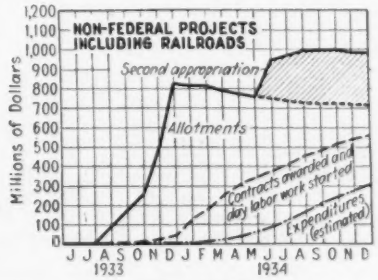
Allotments for federal projects total $1,557,112,805 to Jan. 1. Contracts awarded (including day-labor work started) amount to $1,324,897,806. Money spent totals $895,223,153. The widespread program of water supply, power, flood control and navigation, still dominated by Boulder Dam on the Colorado River, includes the great Bonneville and Grand Coulee dams on the Columbia River, Fort Peck on the Missouri, the All-American Canal in California's Imperial Valley; Mississippi, Missouri and Ohio river flood-control and navigation works.

The failure analyzed

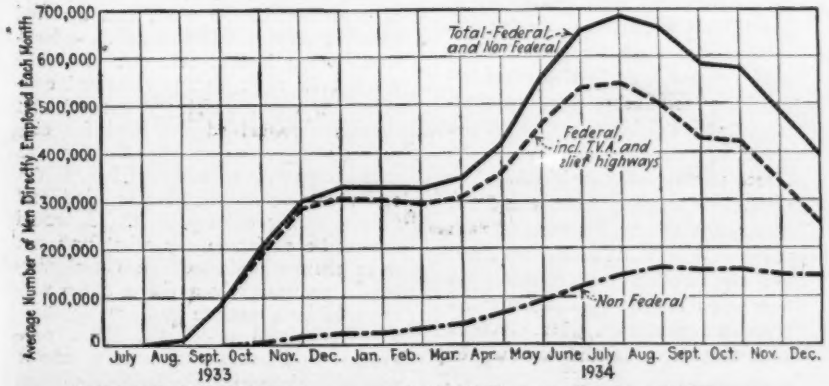
In reviewing the accomplishments of PWA the circumstances under which it operated, especially in its early period, must be kept in mind. The public-works movement had been planned, early in 1933, as a powerful business stimulant that would have quick action for recovery. Accordingly, even before the Recovery Act with its large public-works appropriation was passed, a complete decentralized scheme of organization had been worked out and an engineer selected for every state. The plan was to have an engineer, a finance examiner and a competent legal head in each state. Except for selecting lawyers and finance men, the plan was ready to go the day after approval of the act. But this plan was overturned by the President, and after weeks of delay (part of it necessary for devising a new system of operation) a centralized organization was established instead. This in the end led to long delay, because of the bottleneck created at Washington headquarters.

With reconstitution of the operating system into the actual PWA organization, the quick-action principle was overpowered by a rigid view of the financial responsibilities, a hardboiled banker spirit reflected in the judgments of the financial and legal divisions particularly, much like that which had pre-



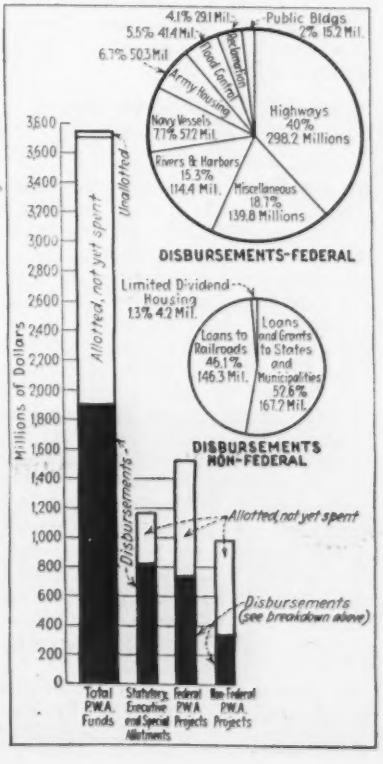


RELATIVE POSITIONS of PWA allotments, contracts and expenditures on federal and non-federal projects reveal some $500,000,000 of contracts yet to be let.



DIRECT EMPLOYMENT is now provided by PWA money for about 400,000 men, a decrease from the peak of 700,000 achieved last July.

ALLOTMENTS of public-works fund and distribution to date of expenditure.



vailed a year before in the RFC construction-loan operations. Engineering scrutiny of projects was not supercritical, though sound plans were at all times insisted upon, and judgments as to economic feasibility were often liberal rather than narrowly restrictive. Nevertheless, the difficulties arising in the other branches of the work caused hair-raising delays. Diversity of state laws and the unfamiliarity with these laws of a hastily assembled staff of young lawyers contributed much to the early difficulties. Complications inseparable from the rapid building up of an organization of several thousand men in the Washington office all contributed to loss of time.

It is estimated by men familiar with the actual operation of the huge administrative machine that the decision to centralize, coupled with the banker attitude of the PWA, caused a loss of at least half a year's time. In view of the fact that even the fastest possible initiation of a great countrywide system of emergency public-works construction would have been slow compared with the hopes of those who expected to see millions of men put to work immediately, it may be concluded that the six months' further delay added to centralization was fatal to the fundamental objectives of the movement.

To express this in other form, the failure of the PWA to exert a recovery effect does not represent failure of the public-works plan. The public-works recovery plan has not yet been tried.

Construction in Relief Service

IN A PERIOD of 4½ months, through the winter of 1933-34, CWA provided jobs and bolstered morale for 4,000,000 unemployed who did not want charity, created new increments of public property value and exerted a sustaining effect on retail business - - - ERA continues effort

By JACOB BAKER
Assistant Administrator, Federal Emergency Relief Administration

THE WORK PROGRAMS of the Civil Works Administration and the Emergency Relief Administration were designed first and foremost to provide a method of relief. This was and still is the chief objective. Both the desires of the unemployed themselves and the need for preserving their morale dictated the development of a work program as opposed to straight relief. As a consequence, it was expressly stipulated by the President that two million of the four million CWA employees should be drawn from the great mass of unemployed *not* already on the relief rolls.

CWA Planned for Speed

CWA was the President's answer to the challenge of the winter of 1933-34. At a time of deep discouragement it brought renewed hope to millions of people, restored their self-respect and saved them from the slow process of demoralization induced by years of unemployment and destitution. It had the further great merit that it was put into effect with the utmost speed when other plans for reducing unemployment had not yet become fully effective. The President published his executive order creating CWA on Nov. 9, 1933, and by Dec. 7 no less than 2,037,000 people were at work; by January 18 the number had grown to more than 4,000,000. From Feb. 15 onward, the liquidation of CWA proceeded by gradual steps, until by March 31, 1934, the process was complete and the work programs had been returned to the state organizations, to operate with Federal Emergency Relief Administration funds.

Without a doubt it was not believed that a work-relief program by itself would restore prosperity, although CWA went some distance in this direction through the effect its payrolls had on retail business.

CWA took over all the state work projects. But in order to meet the President's desire that four million unemployed should be given jobs as quickly as possible, additional projects had to be proposed, approved and put into operation as quickly as possible. At first there was a tendency in some of the states that had not developed work programs and a technical apparatus for carrying them on, to approve these undertakings too hurriedly. But after the administrative machinery began to function more smoothly, the less useful work was gradually eliminated. In all, some 200,000 projects were approved and put into operation, out of some 400,000 that were studied.

● Beginning early in the depression, long before the relief emergency of the 1933-34 winter, construction and maintenance work was the chief or only reliance for effective relief beyond the food-basket type. Increasingly applied, it became, through the CWA and the later ERA work, the direct partner of the PWA. The prodigious scope of activity and the many solid accomplishments of such relief work form an essential part of the contribution that construction has made toward meeting the depression's problems. Mr. Baker's statement is a factual account of achievement.

—Editor.

CWA regulations provided, in general, that the projects "should fall in a field that lies between normal government expenditure on the one hand and the type of construction ordinarily carried forward by the Public Works Administration on the other." A very large part of the work was such as would not have come within any normal program of construction at all—for example, work on 500,000 miles of secondary roads not in the state highway systems, improvement of waterways, flood control and soil-erosion work, the airport program (under which more than 2,000 airports were enlarged or built new), the drainage of thousands of acres of mosquito-breeding swamps, the building of 250,000 sanitary privies in the rural districts, and a large number of scientific and statistical surveys and researches.

For the most part, CWA projects were carried on for the improvement of public property. Gradually a considerable amount of the work was directed into the service fields so-called—education, public health, art, etc. But the great bulk of it always remained construction work, which grew more and more diversified as the need for employing a greater variety of skills was recognized. As a matter of fact, CWA undertook every conceivable kind and type of construction project. It would almost be easier to say what was not done than what was. In Charleston, S. C., an unsightly garbage dump was replaced by a modern garbage incinerator (completed under the ERA program). In Florida a community center was built of coquina, the largest building of its kind. Just outside Phoenix, Ariz.,

a modern tuberculosis hospital for 150 patients was erected. Ten tuberculosis hospitals, each equipped to accommodate 100 patients, were erected for Puerto Rico. The Cathedral of Learning in Pittsburgh was carried far on toward completion. At the University of Pennsylvania the construction of a differential analyzer, to facilitate the solving of problems in higher mathematics, was begun by CWA workers and is now being completed. The Long Beach (Calif.) city hall, wrecked by an earthquake, was rehabilitated. One of the most modern airport administration buildings was commenced under CWA at the Newark, N. J., airport, and is now being completed by relief labor.

CWA expenditures were divided as follows:

	Per Cent of Total
Roads, streets, etc.	41.1
Public buildings	15.3
Bridges	0.9
Sewers	10.9
Waterworks	3.1
Recreational facilities	2.8
Waterways and flood control	5.3
Erosion, irrigation, grading, etc.	11.3
Airports	1.3
Other construction	0.8
Miscellaneous expenditures	7.2
Total	100.0

Aid extended by CWA

CWA drew liberally from the engineering unemployment lists. There are no exact figures, but it is estimated that probably more than 20,000 unemployed members of the engineering profession took part in carrying out the 200,000 CWA projects. And this does not include the thousands of additional technical people employed.

Indirectly CWA gave a considerable impetus to private industry in the purchase of materials and equipment used on construction work. Of the $864,000,000 disbursed by CWA, 12.4 per cent was spent for materials, and 6.6 per cent for equipment.

Safety work

An interesting corollary to the CWA program, of especial interest to the engineering profession, was the safety program undertaken for the benefit of the 4,000,000 CWA employees. It was the most extensive program of the kind ever put into operation in the United States; it cost about 4c. per employee per week and achieved an estimated saving of between $7,500,000 and $10,000,000 in compensation and medical costs, and the original death and accident rates were cut in half.

JOBS, THE OBJECTIVE of the ERA, are here being made on a Philadelphia flood-control project.

CWA efficiency and costs

In general, reports at hand from the states and other agencies in charge of projects show that the construction work was of excellent quality, comparing favorably with private undertakings. Costs also compared very well, considering the policy of the Administration, which is still pursued under ERA, to use as much hand labor as possible.

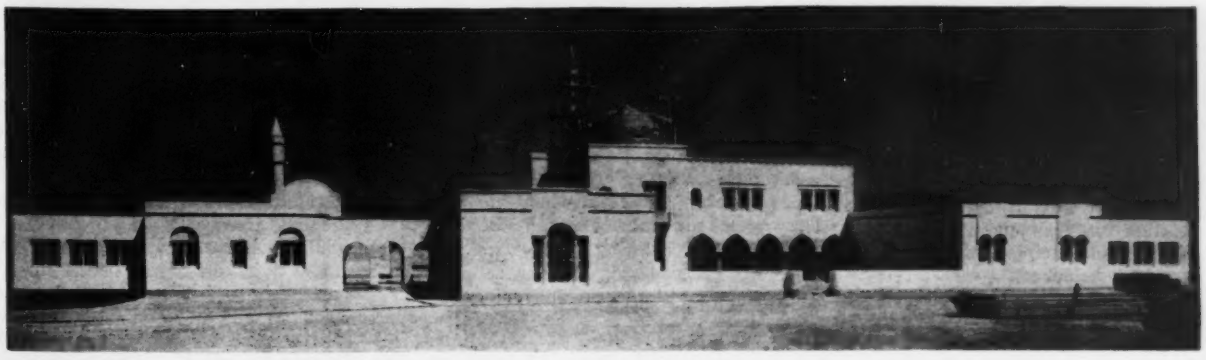
The efficiency of labor, which was all employed on force account, has also been estimated as about equal to that of labor on private jobs. The state reports have for the most part been quite emphatic on this point.

ERA replaces CWA

The ERA work program that replaced CWA differs in many respects from that of CWA. For one thing, CWA took over all the state work projects and was completely separated from direct relief activities. It was a straight employment undertaking. The states kept control of the projects themselves, however, submitting those proposed by various local agencies and operating those approved. In this respect, their autonomy was as complete as it now is under ERA. But under the present set-up, states may decide how much of their federal grants they want to invest in work and how much in direct relief, while, during the CWA period, they were given, in addition to grants for straight relief, specific allocations of unemployed people whom they had to employ on work if they wanted to get the benefit of CWA expenditures.

However, the most important difference is the fact that employment by CWA was based on a full-time job whereas work relief given by ERA is based on the need of the relief client. Thus, the ERA employee works only a number of hours sufficient to give him earnings that will cover his and his family's subsistence needs. In the case of skilled workers, the number of hours of employment is, therefore, considerably less than in the case of unskilled workers, since the

HOSPITAL in Phoenix, Ariz., one of the highest types of projects financed and built by the CWA.



hourly rates of pay for skilled labor are much greater than for unskilled labor.

In other respects, ERA has carried on the CWA program very much along the old lines. It has taken over most of the best CWA projects that had been left uncompleted, and has initiated a great many new projects, of constantly increasing variety, with the emphasis more and more on undertakings calculated to give employment to the white-collar unemployed, such as public education, surveys, scientific research, public welfare and health, arts and planning.

A classification has been made of ERA projects as follows:

Planning projects
Public property projects
Projects to provide housing
Production and distribution of goods needed by the unemployed
Public welfare
Public education, arts and research
Administrative projects
Tools and sundry equipment projects

When CWA was terminated and ERA was set up, there was a decided shift of the unemployed back to the relief rolls and a consequent drop in work relief. However, the current turned once more as the new program developed, and there has been ever since a growing trend toward work relief in most of the states.

The latest reports by the FERA statistical department show the following number of cases receiving work-program earnings:

Month, 1934	Number	Per Cent of Total Cases Receiving Relief	Total Work-Program Earnings
April	1,176,818	26.4	$38,953,678
May	1,343,214	31.1	42,214,039
June	1,477,753	34.9	42,221,757
July	1,723,295	39.5	47,244,553
Aug.	1,922,029	41.9	54,870,823
Sept.	1,950,728	42.2	40,178,571
Oct.	1,998,167	42.9	52,861,038

Still later figures, which have not yet been completely tabulated, tend to show that this drift is continuing, and that in December more than 2,300,000 people were on work relief.

Types of ERA projects

The variety of work carried on by ERA work divisions can be illustrated from a report of the Connecticut administration, which shows that schools, town halls, libraries and other public buildings have been rehabilitated, fire houses improved and new fire houses built, bridges repaired, new bridges built, sewers laid, sewerage-purification plants begun, water mains laid, a new reservoir built, 200 miles of roads improved, 25 athletic fields constructed, several miles of retaining walls and highway fences built, garages constructed, town maps and town planning undertaken, tree surgery carried on, forestry work for fire prevention undertaken, new airports built, an extensive program of mosquito elimination carried through, very considerable projects for control of tree diseases put through by the forestry department, various surveys initiated, including a slum-clearance survey, intended to aid in social welfare and public health improvement, etc., etc.

The benefits to basic industries coming from the ERA work-relief program are very great, just as under CWA, due to the purchase of such materials as are used in the prosecution of the almost innumerable construction undertakings.

ERA engineering employment

As far as the engineering profession is concerned, it is estimated that more than 8,000 engineers are employed by ERA and that, in all, some 20,000 technicians, not including scientists of special qualifications, are helping them on the program. The engineering setup is somewhat similar to that under CWA—a large technical staff in Washington with a corps of regional engineers and assistants. Each state has a work division, with a chief engineer and a corps of assistant and district engineers. The projects themselves are locally supervised.

Obstacles to Housing Progress

THE REASON that housing so far has been all talk and no work lies in the diverse states of mind of the interests concerned and particularly in the fact that no current plan takes into consideration the protection of existing investments - - - For cities, "block reorganization" involving a pooling of properties for progressive balanced demolition and reconstruction would be a rational solution.

ARTHUR C. HOLDEN
Architect, New York City

● Starting with the conviction, based on long study of the housing problem, that present tendencies are not conducive to early advance in this field, Mr. Holden presents a keen analysis of the obstacles that must be removed or circumvented if housing is to lead the way in construction revival.

● Mr. Holden finds no direct way out—he is an architect, not a financial innovator—but he suggests an indirect attack via pooling of existing properties for either modernization or rebuilding in block or larger group units.

—Editor.

HOUSING has been the talk of the day. It was to put many millions back to work; it was to help the nation out of the depression: it was to prove the usefulness of the construction industry; and it was to establish a proper standard for American life. So far none of these eminently desirable ends has been achieved. The one basic reason for this lack of progress is that no plan has yet been tried which seeks first and fundamentally to maintain the stability of the existing financial structure, particularly mortgage investments. We must seek the reasons for the present *impasse* in housing, then suggest a solution that will make housing a vital factor in achieving social stability and economic balance.

That ever-ready barometer of public opinion, the Congress, early responded to the urge to utilize our surplus labor to improve the standard of American homes. The situation seemed to demand two types of action.

The first step was to save the home-owner's investment. Wholesale foreclosures were creating a national problem and destroying values. The Reconstruction Finance Corp. was empowered to make loans to savings banks and other institutions against their long-term assets. Still broader action was necessary. The Home Loan Bank Board and the Home Owners Loan Corp. were created to take over and extend the discounting functions of the RFC with respect to home mortgages. The Home Owners Loan Corp. took up two billion dollars' worth of mortgages and issued its debenture bonds in exchange; this was effective in arresting foreclosures and stopping liquidation.

At the same time Congress foresaw

the need for stimulating new construction in housing, and therefore it took the second step. In 1932 the field of the RFC was broadened by authorizing it to make loans for public-works projects and low-rental housing. Only one housing loan was made. In 1933 Congress went still farther and, through the National Industrial Recovery Act, authorized the creation of the Public Works Administration, within which a housing division was formed.

The newspapers have been filled with announcements of work to be undertaken. Every time it was said that work was about to begin the impression was created that some such work actually had gotten under way. Actually only about a half dozen large-scale projects, scattered from New York to St. Louis by way of Atlanta, have reached the construction stage. Naturally, the citizen is confused.

The building industry has had a full eight years of decline and a full six years of experience with subnormal business. It has seen the ship of national prosperity wrecked. It has learned that a shipwreck in a civilized community is a vastly different affair from a shipwreck upon a bleak desert island. In the latter case the stark necessity for shelter would probably have put the entire building industry to work at any cost. The civilized community, however, has shelter of a sort, so that it does not immediately invest its funds in new homes. But the size and power of the construction industry are such that the general welfare of all demands that it be kept at productive work. Otherwise the effective consuming power of the community receives a blow which starts it on the way to disintegration. The problem is to find the terms upon which the construction industry may be put to work to improve existing available properties. One thing is certain: We cannot afford to lose what we have already gained by utilizing the construction industry to build up new unrelated properties that may compete on terms threatening to renew the process of liquidation which the nation has fought so hard to arrest.

New salesmanship needed

To initiate any construction project requires enterprise. American enterprise has assumed the existence of an entrepreneur. We must think in terms of groups of owners. We must reconcile their conflicting interests and demonstrate that they may utilize the construction industries to act in concert for their improvement.

Whether we like it or not, society is dependent upon the profit motive. What has the construction industry to offer to those who *now* hold the responsibility for administering the existing facilities of housing, railroads and other public works that will bring them a profit?

If it is to operate in the limitless field of housing, the job of the construction industry today is something more than building. It is salesmanship, but salesmanship of a new type. The construction industry must first think in terms of groups of owners and then demonstrate to the various groups: (1) new ways of utilizing the construction industries; and (2) new methods of payment which will not offset the possible advantages.

Nothing is more difficult than to give an incisive reason for the present impasse in housing. In general, every interest that is involved is desirous of putting the construction industries back to work, but each interest is anxious to put a proviso upon the conditions. It behooves those who are interested in construction to examine carefully these provisos, so that a way may be devised for circumventing the difficulties. In the following an endeavor is made to examine one by one the multiplicity of interests that are concerned with new construction, and to describe briefly their respective attitudes.

Housing Scoreboard

Seven separate attacks on the housing problem produce little actual construction.

Reconstruction Finance Corp.:

●Following on the Home Building and Home Ownership Conference of the Mid-Hoover period, the RFC was authorized to aid housing construction by limited-dividend companies. The single housing loan made has been translated into the reality of Knickerbocker Village, two twelve-story apartment houses on New York's Lower East Side, opened in October ($9,000,000).

PWA Housing Division:

●Inheritor in 1933 of RFC's housing loan prerogatives, and also given permission to loan to municipal housing authorities, this agency made eighteen allotments to limited-dividend companies, eleven of which were later rescinded. Seven projects are under way or completed—in Philadelphia, St. Louis, Raleigh, N. C., Alta Vista, Va., Euclid, Ohio, and the Bronx and Queens boroughs, New York City. Late in 1934, a limited-dividend corporation in Brooklyn was accorded a loan. (Total for eight projects, $13,141,600.)

Emergency Housing Corp.:

●Successor in 1934 of part of the housing division's work, in accordance with a plan for the government to build and own as well as to finance large housing projects, PWEHC has building operations under way on two projects in Atlanta, site clearing on one project in Cleveland, and land acquisition on projects in New York, Chicago (three), Indianapolis, Cincinnati, Detroit, Montgomery, Ala., and Louisville. (Total $74,500,000). In addition, eighteen projects, involving $37,036,500, have been authorized, and eleven are being studied, to cost $12,911,000.

Home Loan Bank System:

●Similar to the Federal Reserve System but operating exclusively in the field of home mortgage finance, this agency now has more than 3,000 building-and-loan and insurance company members (1,000 added in 1934), who may receive long-term loans against home-mortgage collateral.

Home Owners Loan Corp.:

●Set up in 1933 to forestall foreclosure proceedings against home owners, the HOLC made two billion dollars in loans, mostly in the form of its bonds, which it exchanged for mortgages.

Fed. Housing Administration:

●Established by the National Housing Act of 1934 as a means of encouraging the flow of private credit through insurance of mortgages and of loans for repairs, FHA insured some $25,000,000 of modernization loans and stimulated over $100,000,000 of such repair work in its first four months of existence. Insurance of mortgages began in November, too recently for any appraisal of results. The act would also set up "national mortgage associations" as rediscounting agencies, but has not done so.

Subsistence Homesteads:

●As part of the Department of the Interior, this agency has allotted $19,000,000 to 62 projects, providing 6,800 homes whose $3000 cost is to be amortized in 30 years at 3 per cent interest. In a related but independent operation, FERA is building three projects involving some 1,000 homes.

Diverse states of mind

Home Owners—The change in the price level and the reduction of the income of a large proportion of the population have brought distress to those who are home-owners. Because of their present burdensome indebtedness, they are reluctant to incur additional obligations, even though highly attractive loans for modernization purposes are offered. They fear that the modernization of other homes may lessen the possibility of their disposing of their own homes at a favorable price.

Rent Payers—The attitudes of rent payers are varied, but in general they are interested in new housing only in so far as it offers them the hope of getting more for their money than they do at present, or of getting the sort of quarters that they desire at very little greater expense. Already having the advantage of being in a "buyer's market" so far as housing is concerned, rent payers are more interested in increasing their own income than in new schemes for housing that might destroy their advantage.

Property Owners—Owners of unimproved property who have held it for what has commonly been called "investment" are in favor of a housing program, especially if it offers them an opportunity for sale at what they consider a favorable price. On the other hand, property owners who hold so-called "improved" properties, many of whom have been suffering loss or reduction in income, view with apprehension the entry into the field of a new type of housing of higher standard at a lower price that may turn away from them a dangerous proportion of their remaining income. Owners of depreciated properties offered for rent look with favor upon putting emphasis on the modernization and improvement features of a housing program. They look with hope upon loans at favorable terms which may permit them to dress up their properties so as to attract rent payers or prospective buyers.

Real Estate Operators—There is a class of owner commonly known as an operator who does not hold for long-

term investment, but who lives by what is known as "turning over properties." Frequently he may make the building of homes or apartments part of his business for the reason that he may turn over improved properties more easily than unimproved properties. Depending for his profit upon an advancing price, he is alarmed at the prospect of a housing program which aims at producing superior facilities at reduced rentals. His motives are mixed because of his enthusiasm for any proposal which may "move" properties, on the one hand, and his fear of a policy which may reduce prices, on the other.

Real Estate Brokers—Those business men who depend for their livelihood upon commissions paid to them as agents for the sale or leasing of properties have suffered greatly because of the failure of properties to "move." They have encountered difficulties in the rental market. In their attempt to carry out the instructions of an owner, they have been forced to let opportunities for making a lease go by because of cut-throat competition on the part of owners who were more desperate. They view with alarm a program which suggests the stimulation of building except at a time when rents are advancing buoyantly. They suggest as a compromise that an "artificially stimulated" housing program should confine itself to the very lowest income level and to the providing of homes for those who cannot afford to pay "commercial rents." By such an attitude, they imply a need for "subsidizing" housing of extremely low rental level.

Real Estate Managers—Among the real estate managers are to be found the majority of the best thinkers in the profession. In the administration and management of properties they have had first-hand contact with the same tendencies that have made the brokerage business so difficult. Managers as a group, however, are extremely sensitive to the burden of waste and to uneconomic administrative methods. They are alert to the possibilities of large-scale housing enterprise and are, from an intellectual point of view, keenly interested in it, even though they cannot see for themselves large opportunities for profit in the salaried positions of new large-scale enterprise.

Title and Surety Companies—Transfers of property and liens against property may all be recorded with a county registrar. But individuals to whose advantage it is to conceal true records have made governmental record-keeping difficult, and as a consequence there has grown up an enormous and expensive business based upon searching and clearing of titles. There has also grown up a legal fiction that surety bonds, for the execution of specific work such as construction, made by "responsible" companies, are equivalent to construction actually executed; the sale of this type of bond has made it possible to keep in business all sorts of irresponsible contractors. The collapse of prices has brought difficulties to these business interests who had formerly fattened upon premiums paid for title guarantees and other forms of surety. This group looks with disfavor upon any movement which tends to take housing, construction and real estate out of the mystery class and establish it upon rock-ribbed economic foundations.

Social-Minded Groups—No group which has had to deal with poverty, social degradation and crime can be blamed for being vociferous for any movement that is calculated to improve the conditions of living. Among these groups, therefore, are to be found many advocates of what has come to be known as governmental subsidy for housing. They advocate reduced rates of interest, economies of management, limitation of the real estate taxes upon low-rental housing enterprise, and even governmental grants to make possible housing that would not otherwise be economic.

The social-minded group has already performed two valuable functions: It has called attention to the bad conditions of housing which exist and it has painted a picture of what "ought to be possible." At the present time, it is the most vociferous group in saying what ought to be done. It is unfortunate that the social-minded people are in general so lacking in economic knowledge that they frequently defeat their own ends by frightening those business interests which should, in the natural course of things, recognize new ends and desires and set themselves vigorously to the task of translating them into reality.

The Public—The public, which comprises all sorts and groups, especially women, has heard so much talk about housing, without accomplishment, that it turns an unheeding ear. It must be remembered that through the savings banks and through the great insurance societies and other forms of trust funds, the American public is very substantially interested in American homes. The public (and this again includes women's organizations) knows that these institutions are heavy investors in mortgages and therefore does not wish anything to be done which may jeopardize the savings that have been put into insurance societies and savings banks. As a consequence the public has frightened itself into inactivity.

Mortgagees—It is difficult to define the attitude of the mortgagees or to explain the exact situation because it has been so greatly complicated by the entry into the field of the recent mortgage bond houses which, barely realizing what they were doing, conducted an organized racket and did much to disorganize the recognized field of mortgage investment. Because of their permanent nature, buildings cannot be financed by short-term credits. Our system of credit expansion requires the liquidation of credits which are extended to industry for production at the end of a period that is short enough to demonstrate that the credit can be liquidated by the market price received for the goods. Short-term building loans advanced by commercial banks can only be utilized where the short-term loan can be replaced by investment funds.

Technically and legally, a mortgage is a contract by which real estate is pledged for the repayment of a debt. The lending of money at interest secured by a mortgage constitutes an investment. In the event of failure to live up to the mortgage contract, it is usually provided that the principal amount becomes due and, upon failure to make payment, the mortgagee is permitted by law to bring foreclosure proceedings under which the state orders the property to be disposed of in the open market, to satisfy the debt. Savings banks and insurance companies, as well as fiduciaries and trustees, have until recently been limited by law to investments not to exceed 50 or 60 per cent of a conservative capital appraisal. Individuals, however, have not been limited by law, and two practices have grown up which have tended to change the actual character of mortgage investments. On the one hand, individuals have to a considerable extent lent money on secondary mortgages, incurring, of course, greater risks, but, by charging bonuses and other costs, securing a real rate of interest return far in excess of the usual nominal interest rate. In addition, mortgage bond houses, selling what purport to be mortgage securities to the public, made liberal loans covering a much larger proportion of appraised values of buildings. This practice was also followed by a type of realty corporation organized as a subsidiary and frequently operating in connection with some of the less conservative commercial banks.

Easy credit supplied by the mortgage bond houses and realty corporations not only encouraged unregulated construction but made possible unscrupulous financing which placed debts against real estate, thus causing alarm to conservative mortgage interests. The notorious failure of the Bank of United States in New York City was directly attributable to the complicity of its investments with questionable real estate subsidiaries. The failure of many of the largest mortgage bond houses, especially their failure to make good on so-called guaranteed mortgages, created a situation which has caused all mortgage investments to be regarded with suspicion and has seriously damaged public confidence. The decline of incomes and the consequent decline of rents have in turn brought hardship to conservative owners of real estate. Consequently, the margin of safety behind institutional mortgages

has been greatly diminished. Mortgagees, therefore, view with alarm any program of activity in the construction industry which threatens to produce new competitive facilities at lower rates of interest than prevail under existing mortgage contracts.

Government and housing

In addition to the drag on housing progress caused by the diverse states of mind of the multiplicity of interests who have a stake in housing, there are other obstacles that contribute to the present impasse. Among the more prominent of these obstacles are some of the practices of the new federal agencies charged with stimulation of home building. In the first place, the RFC and later the housing division of the PWA set out to lend money to so-called "limited-dividend" corporations, new organizations without experience, owning neither land nor assets with which to proceed. Robert D. Kohn and the group of housing-minded experts with whom he surrounded himself struggled with the problem, and out of 533 applications found only 18 projects that were considered worthy to receive allotments. The attempt was then made to set up local housing authorities, but the PWA refused to give them funds to use "indiscriminately," with the result that local planning and initiative were held up. Finally responsibility for housing was centralized in Washington in a new corporation which has made only slow progress in acquiring land in various cities, and no progress at all in actual building. Another important agency, the Federal Housing Administration, created to stimulate private investment in housing by providing for insurance of mortgages, is faced with a task almost as difficult as that of the PWA.

The low state of municipal finances, government competition with established construction organizations through departmental planning, day-labor construction and the usurpation by relief workers of engineering and architectural activities, have been other obstacles to housing progress. The attitudes and practices of labor organizations, too, must share some of the blame for the housing impasse. Lower wages in the building trades theoretically might stimulate construction, but any effort to reduce hourly wages must, in all fairness, be preceded by an attempt to plan for greater continuity of employment.

Finally, obsolete building practices, made mandatory by unrevised building codes, are a deterrent to new house building. Our unrevised building codes are too often the result of efforts to keep special advantages by local building materials interests and trade groups.

It should be clear that the impasse in housing and construction is due to the obstacles cited above and particularly to the failure of various groups representing diverse interests to grasp the problem as a whole. It is natural for men to be guided by their feelings rather than by rational thinking, and, at the present time, it is fear that dominates their actions or dictates their refusal to act. It is plain unreasoning fear; fear that investments may be jeopardized; that easy new credits may give ruinous advantage to competitors; that the government in its eagerness to put men back to work may itself be forced into competition with existing private enterprise.

KNICKERBOCKER VILLAGE in New York, the only low-cost housing development financed by the RFC. Consisting of tall buildings, it was made possible by capitalizing land at $15 per square foot. Writing up of capital charges could have been obviated by a pooling of original interests rather than purchase, and owners might have had their income restored through the rehabilitation of the property. This project carries no plan which insures the development of contiguous blocks.

Breaking the impasse

The question before us is to learn what tools we have to work with, and to set to work applying them immediately. Both the National Industrial Recovery Act and the National Housing Act stipulated that advance planning should be done. Unfortunately both of these acts required the charging back to ultimate project costs, or to the central fund, the cost of planning, research and pioneering work. When there is a task to be undertaken which requires great technical skill, the first step is the engineer's report. It is impossible to bridge a great river or to dig a canal across an isthmus, until a report is made stating existing conditions and recommending preparatory work which must precede actual construction.

In the new field of housing there has been a tendency to shy away from the actual problem. There is a refusal to consider all housing as a single entity. When the question is asked—What can we do to get rid of bad housing, specifically, for instance, on the lower East Side of New York? the recommendation is made that new and cheaper land should be developed. But if our slums are really plague spots, and if we desire to use our surplus labor to transform them, we must insist that recommendations be prepared that will deal with that problem and not sidestep it. By dividing up such a large neighborhood as the lower East Side into smaller districts, it would be possible to assign competent architectural, real estate, and economic advisers with instructions to prepare specific recommendations for each district. It is important that mortgagees should join with the technicians in working out plans whereby new credits can be liberated for re-employment in the construction industries on the basis of building replacement and improvement, but such a program must be designed to stabilize instead of jeopardize existing investments.

A housing solution

The new Work Relief Bill involving over four billion dollars should make it possible to set all of the technical talents of the country to work studying the specific localities that require improvement and rebuilding. As a condition to aid extended for the original survey, and for the financing and reconstruction, the President can insist that owners of existing properties enter into binding agreements so that the public money will be distributed over the whole district rather than be

expropriated for the advantage of a limited number of individuals. Agreements may range all the way from apportionment of funds for modernization to the actual pooling of properties into an operating corporation or trust, with a result such as is shown in the accompanying chart.

It is particularly important to note that where such group rehabilitation and replacement is undertaken, existing mortgages can be insured under Title II of the present National Housing Act, thus protecting the existing interest of mortgagees. Furthermore, the funds that will be needed for improvement on large scale, may come either through the existing Public Works Administration, or through the appropriation liberated by the new bill. Even if in the latter case these funds are loaned without interest, they need not be unfairly competitive provided they are broadly distributed. They may, in the case of housing, be returned to the federal treasury through twenty-five equal payments of amortization. Rapid amortization need not be more burdensome than the prevailing interest rate, and it would relieve the Treasury of the necessity for reimbursing itself for housing through general taxation.

Here would be a program on which both real estate and construction and the banking and investment interests could agree. As step 1, the President should retain all of the technical professions to formulate plans, and they should be paid on the basis of value of work instead of on a relief basis. The second step would be to use the credits at the President's disposal to put the entire resources of the construction industries at the disposal of the present owners and investors in existing real properties. Labor should be paid on a work basis and not on a basis of relief. Through amortization payments the credits could be liquidated in good order and thus uncontrolled inflation could be avoided.

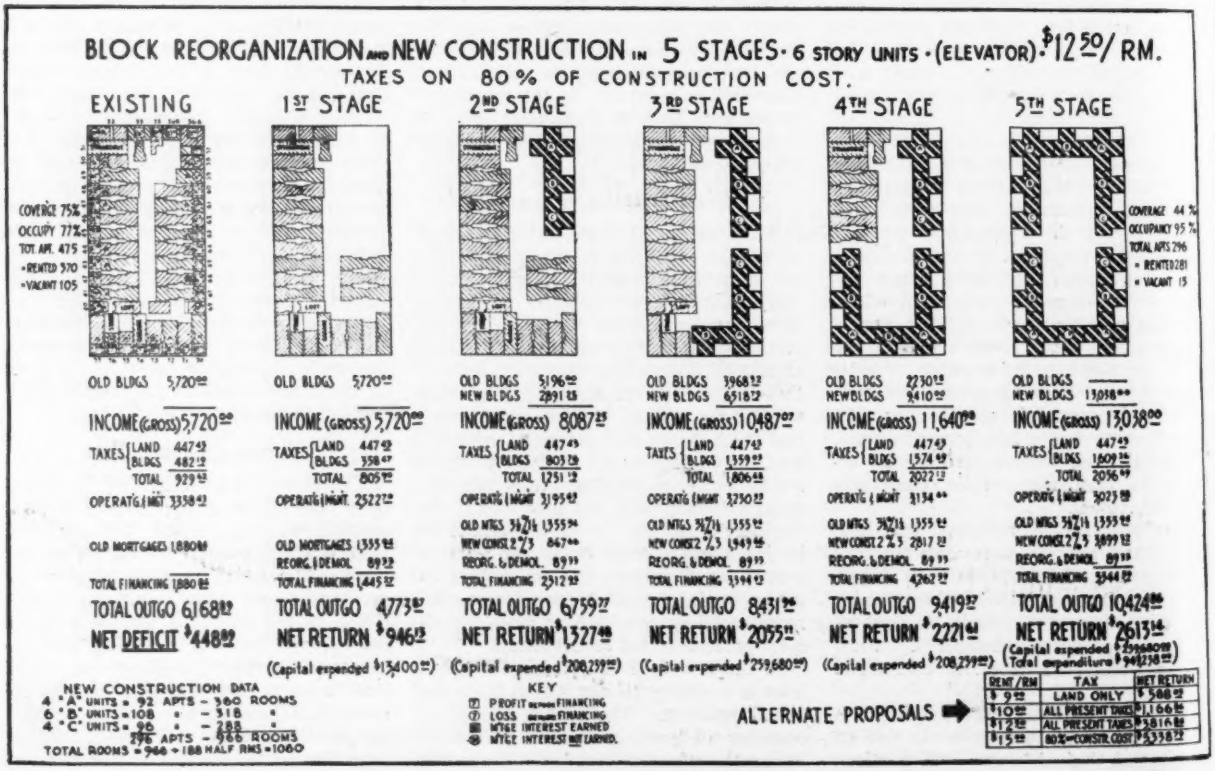
Two psychological obstacles

There is nothing to hamper the initiation of such a program except two psychological obstacles. The first is the inability of realty owners to group themselves into new entities which will permit aid to be extended to them on the basis of the group rather than the individual. This is not the place for a detailed discussion of the technique of large-scale planning nor the details through which owners may cooperate to form a community, but the writer has studied this problem and firmly believes that in spite of the legal difficulties this obstacle can be overcome.

The second psychological obstacle is the fear that property owners may unfairly capitalize to their own advantage the benefits of the improvements to their properties. As a matter of economics, however, the re-employment of the construction industries upon a plan of well-distributed work should bring the stimulus to earning and consuming power which the nation needs. This means that we will get nearer to paying for shelter on a service or rental basis. The evils we have known in the past have been the result of speculation in the capital product of housing itself. The public has been deceived and cajoled into taking part in this speculation. If we are to achieve social stability and economic balance, we must get back on the basis of the economic exchange of services.

Ignorant, well-meaning people frequently prevent progress by their cry of "wolf." This class of people are crying out against those who own real estate. They are asking that the government enter the field of housing ownership to subsidize the groups who today cannot afford to pay rent. Such groups retard the flow of credit at a time when the liberation of credit is essential for re-employment and for consumption. By attacking realty owners they attack merely the physical bodies which have been ravaged by the evil spirit of credit manipulation. The job of the government today is to stabilize credit flow. Cooperative participation for the improvement of America's housing equipment can be won by first making the program clear and then by extending credits to those who agree to join together cooperatively, so that improvements may be planned in terms of the group and the community.

BLOCK REORGANIZATION and progressive replacement study of a typical tenement block, with apartments now 23 per cent vacant. The plan suggests rearrangement of vacancies and the stage demolition of old buildings followed by construction of new, eventually turning a $448 monthly block deficit into a $2,600 profit, to be divided among present owners.


BLOCK REORGANIZATION AND NEW CONSTRUCTION IN 5 STAGES · 6 STORY UNITS · (ELEVATOR) · $12.50/ RM.
TAXES ON 80% OF CONSTRUCTION COST.
EXISTING
1ST STAGE
2ND STAGE
3RD STAGE
4TH STAGE
5TH STAGE
COVERGE 75%
OCCUPY 77%
TOT. APT. 475
= RENTED 370
= VACANT 105
COVERAGE 44 %
OCCUPANCY 95 %
TOTAL APTS 296
= RENTED 281
= VACANT 15
OLD BLDGS 5,720.00
INCOME (GROSS) 5,720.00
TAXES LAND 447.42 BLDGS 482.12 TOTAL 929.54
OPERATG. (NET 3,338.42
OLD MORTGAGES 1,880.00
TOTAL FINANCING 1,880.00
TOTAL OUTGO 6,168.42
NET DEFICIT $448.42
OLD BLDGS 5,720.00
INCOME (GROSS) 5,720.00
TAXES LAND 447.42 BLDGS 358.47 TOTAL 805.89
OPERATG. (NET 2,522.72
OLD MORTGAGES 1,355.84
REORG. & DEMOL. 89.33
TOTAL FINANCING 1,445.17
TOTAL OUTGO 4,773.12
NET RETURN $946.72
(Capital expended $13,400.00)
OLD BLDGS 5,196.00
NEW BLDGS 2,891.83
INCOME (GROSS) 8,087.83
TAXES LAND 447.43 BLDGS 803.69 TOTAL 1,251.12
OPERATG. (NET 3,195.93
OLD MTGS 3½% 1,355.84
NEW CONSTR 2½% 847.00
REORG. & DEMOL. 89.33
TOTAL FINANCING 2,312.33
TOTAL OUTGO 6,759.27
NET RETURN $1,327.88
(Capital expended $208,259.00)
OLD BLDGS 3,968.12
NEW BLDGS 6,518.12
INCOME (GROSS) 10,487.07
TAXES LAND 447.43 BLDGS 1,359.22 TOTAL 1,806.65
OPERATG. (NET 3,250.02
OLD MTGS 3½% 1,355.84
NEW CONSTR 2½% 1,949.66
REORG. & DEMOL. 89.33
TOTAL FINANCING 3,394.83
TOTAL OUTGO 8,431.25
NET RETURN $2,055.82
(Capital expended $259,680.00)
OLD BLDGS 2,230.12
NEW BLDGS 9,410.00
INCOME (GROSS) 11,640.12
TAXES LAND 447.43 BLDGS 1,574.99 TOTAL 2,022.42
OPERATG. (NET 3,134.44
OLD MTGS 3½% 1,355.84
NEW CONSTR 2½% 2,817.32
REORG. & DEMOL. 89.33
TOTAL FINANCING 4,262.32
TOTAL OUTGO 9,419.32
NET RETURN $2,221.81
(Capital expended $208,259.00)
OLD BLDGS —
NEW BLDGS 13,038.00
INCOME (GROSS) 13,038.00
TAXES LAND 447.43 BLDGS 1,609.26 TOTAL 2,056.69
OPERATG. (NET 3,023.88
OLD MTGS 3½% 1,355.84
NEW CONSTR 2½% 3,899.32
REORG. & DEMOL. 89.33
TOTAL FINANCING 5,344.49
TOTAL OUTGO 10,424.86
NET RETURN $2,613.14
(Capital expended $ 299,680.00)
(Total expenditure $ 941,258.00)
NEW CONSTRUCTION DATA
4 "A" UNITS = 92 APTS - 360 ROOMS
6 "B" UNITS = 108 " - 518 "
4 "C" UNITS = 96 " - 288 "
296 APTS - 965 ROOMS
TOTAL ROOMS = 946 + 188 HALF RMS = 1060
KEY
P PROFIT on new FINANCING
L LOSS on new FINANCING
M MTGE INTEREST EARNED
M MTGE INTEREST NOT EARNED.
ALTERNATE PROPOSALS
RENT / RM | TAX | NET RETURN
$ 9.00 | LAND ONLY | $ 580.00
$ 10.00 | ALL PRESENT TAXES | $ 1,166.86
$ 12.00 | ALL PRESENT TAXES | $ 3,016.86
$ 15.00 | 80% = CONSTR. COST | $ 5,358.72

CURRENT NEWS

Senate Committee Hears Testimony On Works Bill

(Washington Correspondence)

SENATE efforts to circumscribe the broad powers granted to the President in the $4,880,000,000 work relief bill gathered force as the Appropriations Committee tried to determine what projects and which agencies will be involved in the program. If action is delayed, it is possible that a separate bill will be passed to release the $880,000,000 of unexpended balances to carry on the FERA whose funds will be exhausted Feb. 10. Administrator Harry L. Hopkins estimates that $750,000,000 will be needed before June 30.

There still is no serious doubt that the $4,000,000,000 lump sum will be provided in some form but some changes in the bill appear certain. Points of attack include the authority for correcting "economic maladjustment" which is explained as applying to submarginal land purchases but might mean almost anything. Further, a restriction that projects be of a type authorized by existing law, and especially that highway work be handled under regular procedure by the U. S. Bureau of Public Roads, is a possibility.

Payment of prevailing wage rates rather than "security payments" averaging $50 per month is advanced by an amendment sponsored by Senator McCarran and another by Senator Davis. There is sentiment also toward limiting the power of Comptroller General J. R. McCarl over the fund.

Testimony heard

Testimony before the Senate Appropriations Committee revealed that the bill was drafted under the direction of D. W. Bell, acting Director of the Budget. He explained that comprehensive authority was granted because it was necessary to be prepared for any contingency that might arise during the next 18 months. Harry L. Hopkins and Secretary Harold L. Ickes were summoned in an effort to obtain some information as to the President's intended use of the big fund. The former was unable to say and the latter frankly did not know. Mr. Ickes said he could use $1,000,000,000 on federal public works and a like sum for non-federal works.

The main bulk of testimony was presented by Admiral C. J. Peoples, Director of Treasury Procurement, who has been making works studies for the administration and is prominently mentioned as one of the possible directors of the new program. This bill, he thinks, is the "last needed stimulation of business which will break the back of the depression." With rising employment, he believes, people on security wages will find work under private industry.

Admiral Peoples suggested that some of the projects may be handled by private contractors who will act as agents, furnishing equipment and supervision. The $300,000,000 fund earmarked in the budget for public works of a usual federal nature, outside the work relief bill estimate, will be handled largely by contract, he said. Grants may be made to states and municipalities for non-federal projects under the works bill, he stated. The possibility of raising federal funds through gasoline taxes or through profits on government sales of gasoline along federal highways was mentioned in the hearings.

Denver Tunnel Contract Let to Utah-Bechtel-Morrison

The contract for enlarging and lining the pioneer Moffat Tunnel, a part of the Fraser River project for expanding the Denver water supply system, was awarded Jan. 23 to Utah-Bechtel-Morrison, Inc., on a bid of $972,576. The engineers' estimate was $1,206,722. The project is financed by a PWA loan and grant of $3,500,000 on a lease basis. An outline of the project appeared in *ENR*, Dec. 6, 1934, p. 730.

The contracting organization consists of three units of the Six Companies, Inc., Utah Construction Co., W. A. Bechtel Co. and Morrison and Knudsen. The second low bid of the six received was $1,158,534 from Winston Brothers, L. E. Dixon, W. A. Johnson, Inc.

California Supreme Court Establishes New Water Law

Establishing the rule of "reasonable use" and repudiating the 50-year old theory of riparian rights, under which the riparian owners of California demand undiminished flood flow of streams, regardless of use, the California state supreme court on Jan. 31 announced a unanimous decision in the case of Peabody vs. the City of Vallejo. This test case will establish a new precedent in western water law. Under the decision the use of all waters of the state of California, riparian and otherwise, will be governed by the doctrine of reasonable use and flood flows, which under the riparian rights doctrine were wasted into the ocean, now may be appropriated and applied to beneficial use.

PWA Begins Condemnation For Boston Housing Project

Condemnation proceedings have been started by the PWA to acquire a site for a low-rent housing project in Boston. The government seeks the acquisition of about eight square blocks of property in south Boston overlooking Old Harbor. Five million dollars have been allotted by the PWA for this development. According to tentative plans the project will provide homes for about 960 families.

Casper-Alcova Project to Proceed on Revised Program

Construction of Casper-Alcova reclamation project will proceed on plans revised to 1934 water rights instead of 1904 priorities as originally planned and will be limited to 35,000 acres, according to recommendations made by Commissioner Elwood Mead and approved by Secretary Ickes. The total cost of the project will be reduced from $23,701,235 to $20,004,254. Work will start as soon as legal formalities have been completed. Inasmuch as the major part of the cost is charged to power, the reduction in cost will reduce the repayment by power sales and enhance the economic feasibility of the project, said Dr. Mead. The cost allocated to irrigation is $80 an acre.

The total cost of the project remains high in the reduced plan because the $8,500,000 Seminoe reservoir and power development are unchanged, and the main canal is to be made large enough so that the entire 66,000 acres could be irrigated if there is sufficient water.

Nebraska's suit for an allocation of waters from the North Platte River should not affect the initial development, said Commissioner Mead, because the Seminoe Dam will store only flood water. Secretary Ickes commented that the revised plan probably would remove the objections which the state of Nebraska had made the basis of its suit.

A report on the legal and water-right phases of the Casper-Alcova project prepared by Solicitor Margold, Department of the Interior, was abstracted in *ENR*, Jan. 24, 1935, p. 138.

Twin Lakes Tunnel Holed Through Feb. 4

The last rock barrier in the Twin Lakes 20,000-ft. transmountain diversion tunnel under the Continental Divide above Aspen, Colo., was blown away during a holing-through ceremony held Feb. 4. Driving of the tunnel commenced at the east portal Nov. 8, 1933, and the west portal was started three weeks later. Fast progress was made in driving the rock headings, one face advancing 985 ft. in one month. The tunnel, of 10.7-ft. horseshoe section, is the major item in a plan to divert waters of the Roaring Fork River and Lincoln Creek from the West Slope through the Continental Divide to Twin Lakes Reservoir on the headwaters of the Arkansas River. From the reservoir waters will be released as needed for an irrigation district located on the river near Ordway, Colo., 250 miles downstream. The present tunnel and collecting and diversion works were built by Platt Rogers, of Pueblo, under RFC financing. A recent addition to the loan will enable the completion of the concrete lining in the main tunnel, the driving of another tunnel for collection purposes and additional canals and diversion dams, sufficient to supply 50,000 acre-ft. annually. A description of the project appeared in *ENR*, Dec. 13, 1934, p. 752.

Boulder Dam Storage is Begun; Colorado River Under Control

ON Feb 1, about 18 months ahead of original schedule, the Colorado River was put under control, and storage in Boulder Dam reservoir started with the closing of the bulkhead gate at the upstream portal of diversion tunnel No. 1. This event marks the beginning of river regulation and flood control, with its resulting protection of Imperial Valley, which was a major factor in the initiating of the project. Storage during the next few months will insure an irrigating supply for the coming season in Imperial Valley.

During the winter months the Colorado River is in a low flow stage and the stream often has a minimum flow of about 6,000 sec.-ft. The water required to be bypassed for requirements below the dam will result in a comparatively slow accumulation of storage until the summer flood season.

Closure procedure

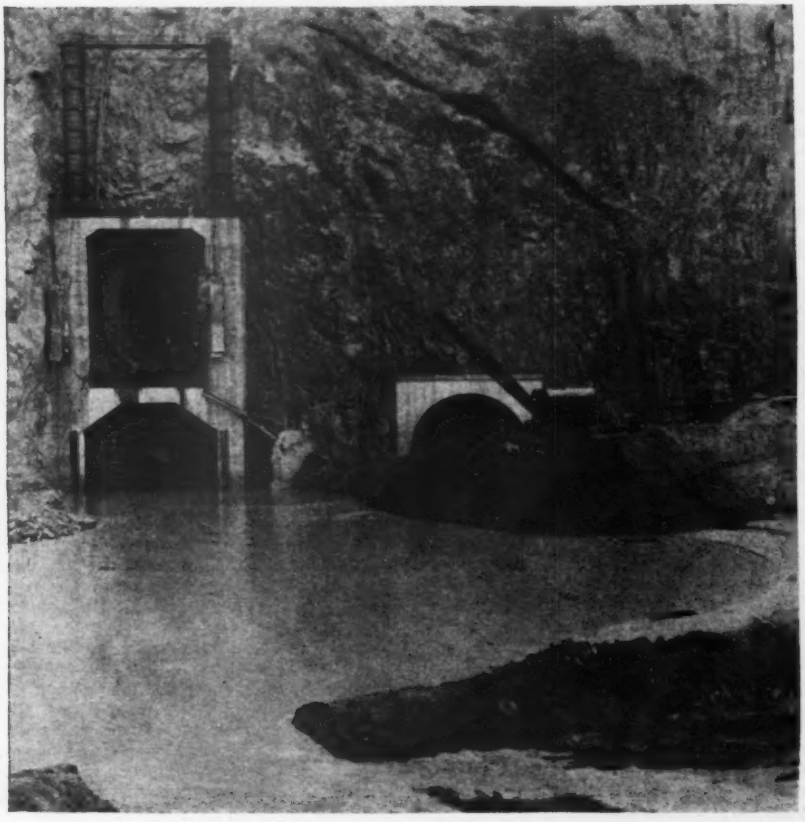
A revised plan for closing the diversion tunnel bypass and beginning the storage of water in the reservoir was worked out last fall. The revised closure plan afforded almost six months more time for work in penstock tunnels. Originally the plan was to make final closure of the bypassed water in the two tunnels which lie nearest to the river (Nos. 2 and 3). These are tunnels in which penstock construction had to be carried on and if they were used for the last diversion, the construction of the penstocks would be delayed until diversion had ceased and the tunnels had been cleaned out.

The revised plan of closure called for casting a plug in the outer 50-ft. diversion tunnel on the Nevada side (No. 1) in which four 6x7½-ft. openings were left to serve as conduits. Each of these openings has two hydraulically operated slide gates, placed in tandem, and when conduits and gates were completed, the gate at the upstream end of diversion tunnel No. 4, on the Arizona side, could be lowered to stop unregulated flow. Then, with stream flow passing through these 6x7½-ft. conduits on the Nevada side, the concrete plug in tunnel No. 4 can be placed. Flow past the dam will be controlled by the slide gates in tunnel No. 1 until one of the intake towers and its connecting outlet works is ready to receive the flow. The 6x7½-ft. gates will have a combined capacity of 21,000 sec.-ft. under a head of 300 ft.

After the tandem gate valves in tunnel No. 1 are closed, the conduits behind the gates can be filled with concrete by means of access tunnels from the tunnel system within the dam. This tunnel system has been extended from the upstream plug in tunnel No. 2 to give access to the conduits in the plug of tunnel No. 1.

This program made it possible to make final closure in tunnels 2 and 3 early last fall. Tunnel 3 was ready for penstocks Oct. 15 and tunnel 2 on Nov. 15.

Bulkhead Gate Closure Starts Storage in Boulder Dam Reservoir



Howell Made Chief Engineer of Los Angeles Flood Works

C. H. Howell, Albuquerque, N. M., on Jan. 30 was appointed chief engineer of the Los Angeles County Flood Control District, by the county board of supervisors. Mr. Howell succeeds Samuel M. Fisher, chief engineer since the resignation several months ago of E. C. Eaton. Mr. Fisher recently had submitted his resignation, to become effective with the appointment of a successor. After accepting Mr. Fisher's resignation and appointing Mr. Howell as chief engineer, the board of supervisors appointed Mr. Fisher chief dam engineer for the district.

Mr. Howell is a graduate of the University of Illinois in the class of 1905 and practically all of his work has been on irrigation and water conservation projects. He spent twelve years with the Bureau of Reclamation. From 1929 to 1933 he was chief engineer for the J. G. White Engineering Corp. in Mexico City. He succeeded J. L. Burkholder as chief engineer at the Middle Rio Grande Conservancy District in New Mexico in 1933.

The county supervisors also named F. E. Trask, former PWA consulting engineer for California, as permanent consulting engineer for the flood control district, to serve any 100 days in the year which might be designated by the board. The supervisors also voted to engage L. F. Harza as a consulting engineer. Mr. Harza was a member of the consulting board which recently recommended suspension of work on the San Gabriel Dam No. 1 while plans for redesigning the structure were considered. The appointment of Mr. Howell was by a four to one vote of the board of supervisors. The salary of the chief engineer is $9,000 a year.

Texas Proposes a Gas Line To St. Louis and Detroit

The state of Texas has approached Administrator Ickes on a proposal to construct a natural gas pipe line from the Texas Panhandle to St. Louis and Detroit, preliminary to filing a formal application for a combined loan and grant from the PWA. Following a conference with R. B. Anderson, state tax commissioner, Secretary Ickes said that the project would utilize a vast volume of natural gas that is now going to waste and lower the rates for gas in the cities to be supplied. The cost is estimated at $50,000,000 if separate lines are built to St. Louis and Detroit, or $30,000,000 if only one line is built, according to plans described as only tentative. The proposal, said Secretary Ickes, is to create a state authority, but in order to get rights-of-way it would be necessary for the federal government to exercise its right of eminent domain.

North Atlantic States Meeting of Highway Officials

The eleventh annual meeting of the Association of Highway Officials of the North Atlantic States will be held in Baltimore Feb. 13-15. In addition to the usual program of technical papers, an excursion has been arranged to inspect the Maryland experimental road.

WASHINGTON

By Paul Wooton
Washington Correspondent

Indications now are that Rear Admiral Christian J. Peoples will not be the directing head of the work relief program. He has been pushed out in front in a rather indefinite way to receive Senators, Representatives and delegations from chambers of commerce so as to give the man who really is to administer the program a chance to work out his plans without being bothered.

In announcing that the Federal Reserve index had jumped from 74 per cent to 86 per cent of the 1923-25 average it was pointed out that much of the improvement was due to increased automobile production. With consumer goods industries operating at what appears to be their high point no further improvement is expected at the Federal Reserve until construction picks up.

Prospective income from rentals still is 25 per cent less than the cost of new construction, Federal Reserve figures show. One factor is the relatively high interest rate on long-time funds. Rates are out of line with the very low cost of short-time money. This is particularly true for the money needed in addition to that secured by the first mortgage.

The Great Western Power Company has applied to the Federal Power Commission for a preliminary permit covering a 400,000 hp. project on the North Fork of the Feather River. Six power developments are proposed. They are to utilize all of the available head between the existing Caribou and Big Bend developments. The power is to be used for public utility purposes in North and Central California. The applicant is a subsidiary of the Pacific Gas & Electric Co., which has been planning for this development for nearly 20 years.

While it is improbable that a mandatory provision will be added to the work relief bill to require the President to employ the contract system where practical, so much has been said about it on Capitol Hill and to administrative officials that a revision of the plan to use the force account method exclusively is regarded as practically certain.

Those who are anxious to see a substantial amount of the work relief fund allotted to road building are not insisting upon definite earmarking by Congress. It is believed that the employment record on highway projects has been such as to assure sympathetic consideration for that type of work from those who will administer the work relief program.

American Concrete Institute Meeting in New York

The thirty-first annual convention of the American Concrete Institute will be held in New York City, Feb. 19-21. Among the general themes to be discussed by the numerous technical papers are: What of the New Cements?, Concrete House Construction, New Frontiers of Reinforced Concrete Design, Vibration of Concrete and Building Regulations.

Wood Aerial Surveys, Inc.

PHILADELPHIA APARTMENTS BECOME PWA HOUSING PROJECT NO. 1

First to be completed of PWA's large-scale housing developments is the Philadelphia project of the Juniata Housing Corp., a limited-dividend company that borrowed $1,039,000 from the federal agency and in addition contributed about $125,000 itself. Sponsored by the American Federation of Full-Fashioned Hosiery Workers, whose mills appear in the background, the project is located in the outlying Kensington industrial district, far separated from the slums of the city. In this respect it resembles the two PWA developments in New York — Hillside Housing and Boulevard Gardens.

Some 4½ acres of land are in the plot, which is less than half covered by the three-story semi-fireproof buildings, a contrast to the development shown at the right. There are 1,085 rooms provided, and an interesting detail is the entire absence of corridors; stairwells connect to porches which serve, in general, two apartments. Architects for the work were Kastner & Stonorov.

Contractors Assured Participation in New Work Relief Program

CONTRACTORS will be included in the operation of the proposed relief works program, according to assurances given by four administration representatives before the annual convention of the Associated General Contractors in Washington last week. George L. Berry, NRA Deputy Administrator in charge of construction codes, stated that in a recent conference at the White House, the President assured him that contractors have nothing to fear from the operations of the new works program. The President, Mr. Berry said, realizes that contracting and the entire construction industry are vital elements in the durable goods industries, and that he contemplates no disturbance in construction that might affect the continued recovery of the durable goods industries, upon which recovery of the whole nation now depends. Contractors will get a fair share of the work provided by the new program.

Dr. Elwood Mead, Commissioner of Reclamation, stated that he was not worried about the manner in which the new works program will be conducted. In the execution of heavy construction, he said, such as structures built by the Bureau, it is impossible to conduct the work by any method other than contracting with the present organizations. It is unthinkable that the President has anything else in mind.

General E. M. Markham, Chief of Engineers, declared that the successful conduct of $500,000,000 emergency work carried out by the Corps of Engineers in the past two years is largely due to the cooperation, efforts and skill of the contractors. He stated he did not know at the moment how much of the new funds will be allotted to his department, but there is certainly no intention on his part to depart from the present custom of contracting, regarded as vital to the satisfactory and successful completion of the department's program.

A fourth note of cheer for contractors was expressed by W. E. Reynolds, head of the public works section of the Procurement Division of the Treasury, speaking for Rear Admiral C. J. Peoples, Director of the Procurement Division. The policy of the Treasury Department, he said, in its construction work has always been to cooperate with the contractors of the country. It is the belief of officials of the department that construction work can be most expeditiously handled by contract and they believe that this policy should be continued. In connection with the proposed program he stated: "It is my personal belief that the construction industry should be invited to participate in the execution of any plan which must be done in as short a time as this program demands, that the facilities and equipment of organized construction firms should be used."

A.G.C. states position

The position of the association in regard to the proposed program of relief works was expressed in a statement presented at

(Continued on p. 234)

Code Authority View on Wages and Hours Aired at Hearing

AT THE public hearing held by NRA on the employment provisions of all the Codes of Fair Competition, Jan. 30-Feb. 2, various industries were invited to present general recommendations along these lines. John P. Hogan, Vice-Chairman of the Construction Code Authority, appeared for that group and stressed the fact that under the construction code a stable wage structure can be established which, in turn, will mean bidding parity and thus solve the distressing problems which have brought the industry close to bankruptcy.

A transitory industry

Dealing with the difficulty of establishing such a stable wage structure, Mr. Hogan pointed out that the construction industry, while in effect a manufacturing industry, differs from other manufacturing industries in many fundamental aspects. It moves into its market and manufactures its product instead of conducting its manufacturing process in a stationary plant and moving the product into the market. The industry is transitory, highly mobile, and since it is composed largely of small local units, wage stabilization encounters many practical difficulties. Only a very small percentage of all the employees work for the same employer over a long period of time, and there is generally absent the continuity of employment experienced by wage earners in a manufacturing industry who work week in and week out on a particular job in one plant.

The code recognizes the transitory nature of the construction industry and the character of its operations in the fundamental provisions for fixing standards of hours of labor and rates of pay through mutual or so-called area agreements negotiated through collective bargaining in specific regions and for specific construction operations. The fixing of minimum wages for skilled employees, according to Mr. Hogan, such as those established on a national basis by PWA and reflected in the divisional chapters of the Construction Code to apply where area agreements are not effectuated, is new to the construction industry. These national minima have caused disturbance, because they failed to recognize the age-old differentials between wages paid in metropolitan areas and in rural districts. The area agreement which recognizes the right of local self-determination is therefore the only feasible method of securing a stable wage structure throughout the country. He stated that, while progress to date has been slow, with only some fifteen area agreements approved by the President, several changes are contemplated in the procedure which would expedite the negotiation and approval of the agreements.

Higher wages

Further, information secured by the Code Authority through questionnaires clearly indicates an increase in the wages being paid both to skilled and unskilled employees over those paid during the low point of employment during 1932 and 1933. Admitting the existence of a popular reaction that wages paid in the construction industry are inordinately high, he declared this conviction to be generally unjustified, since wages for construction work must be relatively higher than those paid in other industries because of intermittent employment. However, he stated that where there is continuity of employment, or what is more recently termed "security of employment," the industry recognizes that the wage may be proportionately lower.

He made reference to the 40c. minimum rate of the code for unskilled or common labor, and the dissatisfaction of certain southern states with this rate which resulted in the action taken by the Construction Code Authority of recommending to NRA exemption to members of the industry in these states, provided a new minimum rate of 30c. per hour is established and wage protection is afforded to the skilled employees.

Contractors Assured Work In Administration Program

(Continued from p. 233)

the meeting. In brief, the statement pointed out the shortcomings of the present PWA program, and asked that previous errors be eliminated. The shortcomings were enumerated as: 1. Too much time consumed in converting appropriations into wages, excepting the work accomplished by the Corps of Engineers, the Bureau of Public Roads operating through the state highway departments, the Supervising Architect and the Bureau of Reclamation; 2. the wage scales adopted restricted private construction rather than protected it; 3. the usual supervisory agencies of construction, familiar with local needs, were ignored; 4. administration from a central bureau delayed getting men to work, making the formation of CWA necessary, which resulted in financing the depression rather than recovery. The statement recommended the full use of every established and improved agency of construction to obtain speed and effectiveness in the new program. The threatened assumption of functions of the constructor by the government becomes a threat of ultimate nationalization of industry as a whole, and can only deter or defeat the primary purpose of the government's effort to promote recovery.

Lack of space here prevents comment on several interesting papers presented before the convention.

Numerous resolutions were passed, including a condemnation of PWA zone wage rates and the PWA 30-hour week, protesting against PWA regulations requiring hiring of skilled workers and equipment operators through relief agencies and a blanket resolution directing the A.G.C. administration and Washington staff to vigorously oppose all proposed legislation that adversely affects the interests of contractors.

Nick F. Helmers, of St. Paul, and A. W. Merchant, Providence, R. I., were re-elected president and vice-president at large, respectively.

A résumé of the opening day of the convention was given in these pages last week.

SOCIETY CALENDAR

ENGINEERING INSTITUTE OF CANADA, annual meeting, Toronto, Ont., Feb. 7-8.

NATIONAL PAVING BRICK ASSOCIATION, annual meeting, Indianapolis, Ind., Feb. 7-8.

AMERICAN CONCRETE INSTITUTE, annual meeting, New York City, Feb. 20-22.

AMERICAN RAILWAY ENGINEERING ASSOCIATION, annual meeting, Chicago, March 12-14.

AMERICAN WATER WORKS ASSOCIATION, annual convention, Cincinnati, Ohio, May 6-10.

AMERICAN SOCIETY FOR TESTING MATERIALS, regional meeting, Philadelphia, Mar. 6; annual meeting, Detroit, June 24-28.

CONNECTICUT SOCIETY OF CIVIL ENGINEERS, annual meeting, New Haven, Feb. 19-20.

INDIANA ENGINEERING SOCIETY, meeting jointly with other technical societies at Indianapolis, Feb. 19.

KANSAS WATER AND SEWAGE WORKS ASSOCIATION, University of Kansas, Lawrence, Kan., Feb. 20-22.

ENGINEERING SOCIETY OF WISCONSIN, annual convention, Feb. 21-22, Madison.

MINNESOTA SURVEYORS AND ENGINEERS SOCIETY, annual convention, St. Paul, Feb. 21-22.

MINNESOTA FEDERATION OF ARCHITECTURAL AND ENGINEERING SOCIETIES, St. Paul, Minn., Feb. 22-23.

SOUTHWEST ROAD SHOW AND SCHOOL, eighth annual meeting, Wichita, Kan., March 5-8.

INDIANA SECTION, American Water Works Association, Indianapolis, Mar. 7-8.

FLORIDA SECTION, American Water Works Association, West Palm Beach, Mar. 27-30.

CANADIAN SECTION, American Water Works Association, London, Ont., Mar. 27-29.

GREATER NEW YORK SAFETY CONFERENCE, sixth annual meeting, March 5-7.

LOUISIANA ENGINEERING SOCIETY, at its annual meeting, Jan. 19, elected: A. Lee Dunlap president, Allen S. Hackett vice-president, Frank A. Muth secretary Walter B. Moses treasurer and B. H. Grehan director.

ILLINOIS SECTION, American Society of Civil Engineers elected as officers for the ensuing year: F. G. Gordon president, W. G. Arn and Albert Smith vice-presidents and C. W. Haupt treasurer.

AMERICAN INSTITUTE OF CONSULTING ENGINEERS, at a special meeting of the council on Jan. 15 elected: George W. Burpee president, Fred Lavis vice-president and Philip W. Henry secretary.

Ohio to Inaugurate Program of Highway Planning

A long-term program of highway planning and construction in Ohio is to be inaugurated under the new state administration, directed by John Jaster, Jr., newly appointed state highway director. According to Mr. Jaster, the program will look ahead five or possibly ten years in its planning with a view to making the Ohio state highway system a model of state highway development.

Two immediate, major objectives, one affecting a large area contained in the Muskingum Watershed Conservancy District, being studied for development are: (1) elimination of many smaller communities on main traffic routes between large cities and (2) widening of highways and right-of-ways.

According to the new director, a thorough

study will be made of the present highway routes so that the department can begin a program of shortening distances between important cities, eliminating dangerous curves and approaches to villages and doing away with the traffic hazards in many small communities as soon as the program is feasible.

Personals

H. H. HOUCK, formerly bridge engineer of the Alabama highway department, has been appointed state highway engineer.

EMIL SCHULZ assumed the position of county surveyor for Ramsey County, Minn., an elective office, in January, succeeding Paul N. Coates who had held the office for twelve years.

H. D. BURNHUM has been appointed commissioner of maintenance, Alabama highway department. Mr. Burnhum was division engineer of the first division of the state highway department with headquarters at Decatur.

WILLIAM H. CULLIMORE, assistant engineer of highways, Baltimore, Md., for the last nine years, has been named assistant engineer in the office of Bernard L. Crozier, chief engineer of Baltimore, to succeed Nathan L. Smith.

EDGAR A. VAN DEUSEN, formerly with the Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., is now the engineer and manager of the research department for the Bank and Insurance Shares, Inc., New York City, investment bankers.

PROF. W. A. KNAPP, of the engineering staff of Purdue University and for several years in charge of the engineering extension department, has been named assistant dean of the schools of engineering. Professor Knapp has been at Purdue since 1908.

GROVER F. CONROY has been appointed state highway engineer of New Mexico. He succeeds Glenn D. Macy. Mr. Conroy's background includes 30 years of engineering experience on railroad, highway, irrigation and reclamation work. In 1920 he joined the New Mexico highway department, serving as project engineer and engineer-inspector and as district engineer in 1925. For the past several years Mr. Conroy has been engineer for the Portland Cement Association in the state of New Mexico.

CONSTRUCTION STATISTICS OF THE WEEK

ENGINEERING awards are lower this week in both private and public work although the private work is higher than the average week last year. The totals are: engineering construction $17,237,000, private awards, $5,102,000, public awards, $12,135,000, of which $2,515,000 represents federal construction and $9,620,000, state and municipal. This is the lowest week on state and municipal awards since August 23.

Sewerage, bridge and "unclassified" awards exceeded last week. This week's totals in these classifications are $2,502,000; $785,000 and $3,073,000 respectively. Public buildings are down to $1,328,000 and commercial and industrial buildings are down to $675,000 and $1,794,000 respectively. Highway awards dropped slightly below last week to $4,353,000.

The larger awards include: state highway lettings by Alabama, $538,000 and by Michigan, $839,000; sewers and drainage, New Orleans, La., $1,431,000; repairing south jetty at mouth of Columbia River, Oregon and Washington, $1,494,000; improvements to distribution lines and power plants for Tennessee Electric Power Co., day labor and separate contracts, Chattanooga, Tenn., $1,300,000; and 26,174 tons steel rails for Southern Pacific R.R., San Francisco, California.

Private financing continues to provide the new capital, while the PWA commitments recede due to rescissions of allotments and sale of PWA bonds through the RFC to the public bond market. Of the $9,182,000 in state and municipal bonds sold this week, $5,774,000 constitutes a resale of PWA bonds and represents a shift from federal to private investment financing rather than new capital.

Note: The regular monthly summary report covering January construction, cost index, materials production and labor conditions will be published February 14. Prices are published as usual.

CONTRACTS

(Thousands of Dollars)

	Weekly Average Feb. 1934	Prev. 4 Weeks	Week Feb. 7 1935
Federal Government	$10,091	$5,780	$2,515
State and municipal	12,311	15,365	9,620
Total public ...	$22,402	$21,145	$12,135
Total private	3,663	5,383	5,102
Week's total	$26,065	$26,528	$17,237

Cumulative to date:
1934..$199,173,000 1935..$165,501,000*
*Includes Pickwick Dam $22,000,000.

NEW PRODUCTIVE CAPITAL

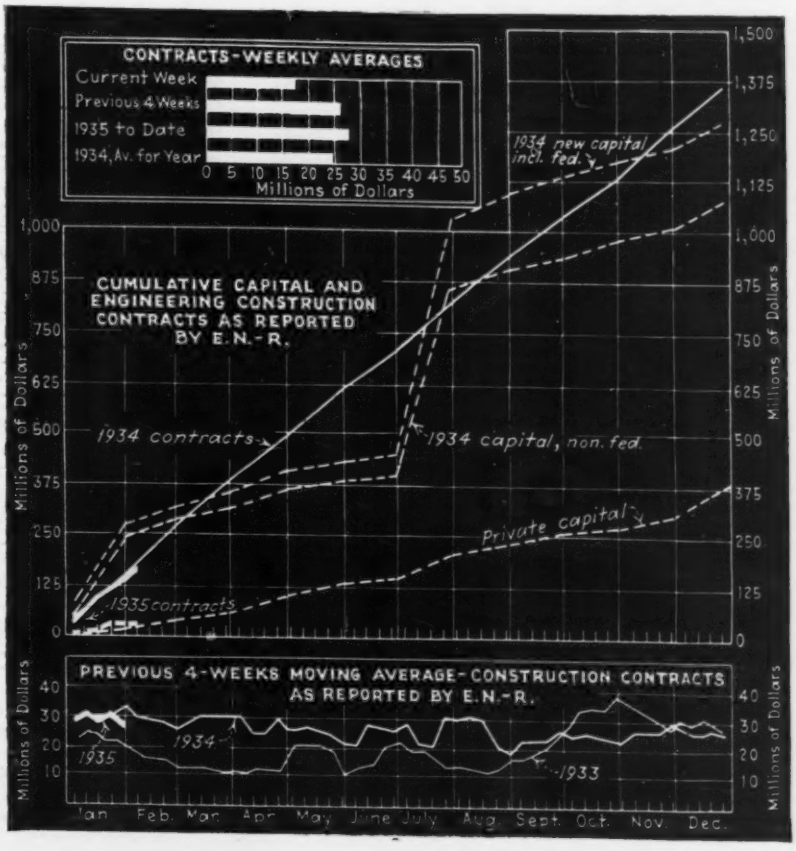
(Thousands of Dollars)

1935	Week Feb. 7	Cumulative
State and municipal...	$9,182†	$43,401
PWA allotments, S&M	—13,438†	—22,590
RFC loans, S&M.....	63	63
Corporate issues	...	....
PWA allotments, private	294	3,946
Total, Non-Federal..	—$3,899	$24,820
PWA allotments, Federal Constr.	3,824	6,355
Total new capital.....	—$75	$31,175

Cumulative to date:
1934...$296,362,000 1935....$31,175,000
†Includes $5,774,000 bond sales by RFC for PWA, involving a transfer of this amount from federal financing to private.

INDEX NUMBER

E.N.-R.- Cost	1913 = 100	1926 = 100	E.N.-R.- Volume	1913 = 100	1926 = 100
Feb.,1935	196.02	94.22	Jan., 1935	130	57
Jan., 1934	198.72	95.52	Dec., 1934	105	46
Feb., 1934	194.06	93.20	Jan., 1934	149	65
1934 (Av.)	198.10	95.23	1934 (Av.)	114	50
1933 (Av.)	170.18	81.80	1933 (Av.)	102	47
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56



CURRENT PRICES OF CONSTRUCTION MATERIALS

CEMENT, AGGREGATES AND READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT (Per bbl., carload lots, including 40c. per bbl. for bags, cash discount not included)			SAND AND GRAVEL (Per ton, carload lots)			CRUSHED STONE (Per ton, carload lots)		CRUSHED SLAG (Per ton, carload lots, f.o.b. plant)		CONCRETE
	Cloth Bags*	Paper Bags	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Ready Mixed 1:2:4, 50 y. or more, delivered
Atlanta	$2.89	$2.64	$2.44	$2.31	$2.31	$1.64	$1.69	$1.92	$1.80	$1.80	$8.25
Baltimore	2.66	2.41	2.21	1.80‡	2.00‡	1.25‡	1.80‡	1.80‡	2.25	2.25	7.35
Birmingham	2.55	2.30	2.10	1.75	1.75	1.40	.85	.85	.90	1.15	5.40
Boston	2.72	2.47	2.27	1.60	1.60	1.15	1.60	1.60	.....	.....	7.00
Chicago	2.85‡	2.60‡	2.40	2.60‡	2.60‡	2.05‡	2.60‡	2.60‡	.....	.....	.....
Cincinnati	2.57	2.32	2.12	1.20	1.20	1.10	1.80	1.80	.....	.....	6.75
Cleveland	2.45	2.20	.....	1.55	1.55	1.45	1.60	1.60	1.75	1.75	8.85
Dallas	2.45	2.20	2.00	1.26	1.26	1.06	2.10	2.25	.....	.....	6.75
Denver	2.85‡	.....	.....	1.85	.....	1.25	.....	.....	.....	.....	.....
Detroit	2.15	1.90	1.70	1.40	1.30	1.15	1.10	1.10	1.30‡	1.30‡	6.00
Kansas City	2.40	2.20	2.00	.75p	.75p	.65p	1.30p	1.25p	.....	.....	7.00
Los Angeles	2.90	2.62	.....	1.60	1.60	1.20	1.60	1.60	.....	.....	6.70
Minneapolis	2.85	.....	2.40	1.00p	1.00p	.25p	1.00p	1.00p	.....	.....	6.90
Montreal	.....	1.70	.....	.85	.90	.40	.85	.95‡	.....	.....	6.00
New Orleans	2.37	2.15	2.00	1.85	1.85	1.50	.....	.....	.....	.....	7.65
New York	2.65‡	2.40‡	.....	1.30†a	1.30†a	.85†a	1.75†a	1.85†a	.....	.....	7.50
Philadelphia	2.60	2.35	.....	1.80‡	1.90‡	1.50‡	1.75‡	2.00‡	1.75‡	1.75‡	7.75
Pittsburgh	2.45	2.20	1.60	1.50‡	1.50‡	1.70‡	2.25‡	2.25‡	1.50	1.50	7.00
St. Louis	2.42	2.17	.....	1.25‡	1.25‡	1.25‡	.75p	.75p	.75§	.75§	6.50
San Francisco	2.72	2.52	2.20	1.35	1.35	1.35	1.50	1.50	.....	.....	7.53
Seattle	2.95	2.70	.....	2.25	2.25	2.25	2.25	2.25	.....	.....	7.56

*10c. allowed for each returnable bag. †Per cu. yd. ‡Delivered. §F.o.b. Granite City, Ill. aBarge lots alongside dock. pf.o.b. plant. s5 tons or more.

CURRENT MAXIMUM NET PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Alpena, Mich	$1.50	$1.45	Ironton, Ohio	$1.60	$1.55	North Birmingham, Ala	$1.75	$1.70
Buffington, Ind	1.60	1.55	Iola, Kans	1.70	1.65	Richard City, Tenn	1.85	1.80
Crestmore, Calif	1.72	....	La Salle, Ill	1.60	1.55	Saginaw, Mich	1.50	1.45
Dallas, Tex. (Inc. 5c. tax)	1.80	1.75	Limedale, Ind	1.60	1.55	Steelton, Minn	1.80	1.75
Hannibal, Mo	1.60	1.55	Mason City, Ia	1.70	1.65	Universal, Pa	1.65	1.60
Hudson, N. Y	1.75	1.70	Norfolk, Va	1.76	1.71	Waco, Tex. (Inc. 5c. Tax)	1.80	1.75
Independence, Kans	1.70	1.65	Northampton, Pa	1.65	1.60	Wyandotte, Mich	1.45	1.40

Cash Discounts, Cement, to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount, 10c. per bbl. for payment within 15 days of date of invoice.

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE—PARTITION—SCORED (Per M, lots of 2,000 pieces or over)			STRUCTURAL CLAY TILE—LOAD BEARING—SCORED (Per M, lots of 2,000 pieces or over)			BRICK (Per M, in quantity)		LIME		
	3x12x12 in.	4x12x12 in.	8x12x12 in.	8x12x12 in.	10x12x12 in.	12x12x12 in.	Common backing	Straight hard	Per ton, Hydrated finishing	in paper, Common hydrated	carload lot, Pulverized or lump
Atlanta	$75.80	$80.80	$151.60	$181.90	$212.20	$242.50	$14.25	$14.25	$24.00	$17.00	$15.90
Baltimore	74.50	80.00	150.00	180.00	209.00	260.00	13.00	17.00	16.75	11.25	19.00
Birmingham	84.25	90.00	156.00	180.00	215.00	242.00	15.00	22.50	3.00§	1.75§	2.25§*
Boston	85.30	91.15	171.00	193.50	239.60	273.40	14.50	17.00	19.00	14.00	3.36p*
Chicago	66.00	70.40	132.00	.....	.....	.....	10.20	11.20	18.00	13.40	14.00
Cincinnati	69.95	74.60	139.90	139.90	174.65	199.20	17.50	17.50	15.97	12.48	.....
Cleveland	62.50	66.50	124.50	149.50	188.00	214.75	16.50	16.50	17.20k	14.40k	2.65kp
Dallas	74.75	80.00	156.50	196.50	240.80	297.00	13.50	22.00	18.20	14.50	1.70 p
Denver	78.50	88.00	141.50	166.50	196.00	225.00	10.00–15.50	21.00–30.00	23.27	16.22	.....
Detroit	63.60	67.80	127.10	230.00	270.00	330.00	11.50	12.50	14.30	12.05	21.56
Kansas City	72.50	75.50	92.00	164.00	169.00	205.00	14.00	23.00	18.20	14.50	2.50§
Los Angeles	77.50	94.25	134.00*	188.00	232.50	311.50	11.50	14.00	18.70	.....	19.70
Minneapolis	78.25s	84.00s	143.00s	165.00s	173.00s	240.00s	13.10	15.10x	25.50	21.00	21.00
Montreal	79.10s	90.40	169.50s	.....	212.40	.....	17.00	22.50	23.00	13.00	.....
New Orleans	61.60	65.70	123.20	158.90	196.70	.....	14.00	.....	16.75	13.05	.....
New York	84.00	90.00	135.00*	193.30†	238.80†	295.60†	12.00	.....	20.80	16.00	20.80
Philadelphia	80.50	85.90	161.00	182.50	235.00	272.00	15.00	18.00	16.35	11.25	10.75
Pittsburgh	72.65c	77.45c	145.00c	165.00c	217.00c	250.00c	17.50	22.00	16.70	15.10	2.75p*
St. Louis	62.00	65.00	120.00	165.00	187.00	214.00	15.00	18.00	.48‡	.38‡	2.80p
San Francisco	84.00	94.50	225.00	.....	.....	.....	15.00	18.00	22.50	21.50	2.05p
Seattle	86.00	94.50	210.00	.....	.....	.....	15.50d	15.50	30.00	26.00	3.00p

*6x12x12 in. †F.o.b. Perth Amboy, N. J. ‡Per sack. §Per bbl., 200 lbs. pPer bbl. 180 lbs. qper bbl. 280-lb. kLCL. dless $1 cash 15 days. slump. tSmooth. x Selected common.

ROAD SURFACING MATERIALS—F.O.B. CITY

	PAVING BRICK AND BLOCKS			PAVING ASPHALT		ASPHALT BINDERS—FLUXES		CUTBACK ASPHALT		ROAD OILS		ASPHALT EMULSION	
	Granite per M, lots of 50,000, 4x4x8 in.,	Brick per M, 3x8½x4 in., carload lots	Wood per sq.yd., 3½ in., 16-lb. treat,	Per ton, less than 80 penetration,		Per gal., 80-300 penetration,		Per ton,		Per gal.,		Per gal.,	
				Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Drum
Atlanta	$ 80.00	$35.00	$2.25	$17.40a	$22.47a	$0.0694a	$0.961a	$19.65a	$25.57a	$0.0694a		$0.105	$0.105
Baltimore	130.00	44.00	2.25	17.00	22.00	.07	.095	.085†	.12†	.....		.....	.....
Birmingham	125.00	24.00	....	18.00	23.00	0.778	.1028	.082†	.112†	.....		.06	.....
Boston	90.00	33.00	2.75	16.00	21.00	.075	.10	.09†	.12†	.075		.09	.125
Chicago	138.00	42.00	2.60	.....	.....	.....	.....	.....	.....	.....		.....	.....
Cincinnati	115.00	37.00	....	18.00	22.00	.09	.....	18.50	.....	.07		.08	.....
Cleveland	100.00‡	32.75	2.95	20.00	24.50	.075	.09	.075†	.049†	.06		.085	.10
Dallas	.....	30.50	....	15.40	21.10	.06	.10	16.40	24.40	.055		.1076	.1438
Detroit	.....	37.00	....	19.67a	24.87a	.....	.....	17.00	22.50	.....		.....	.....
Kansas City	.....	45.00	2.50	13.70	18.70	13.55#	18.55#	.0603†	.0853†	.03		.11	.14
Los Angeles	.....	50.00	....	10.34	14.50	10.34#	14.50#	10.34	34.55	.042		.06	.12
Minneapolis	.....	.....	2.50	18.10	24.60	.098	.098	21.75	.....	.048		.....	.....
Montreal	.....	110.00	....	14.00	19.66	.07	.093	19.00	26.00	.07		.125	.155
New Orleans	100.00	32.00	....	14.50	18.50	.065	.09	.07†	.10†	.....		.....	.....
New York	137.50§	50.00	2.64	17.00	22.00	.07	.095	.085†	.12†	.....		.085	.12
Philadelphia	120.00	45.00	2.25	15.00	20.00	.06	.....	.07†	.10†	.06		.....	.....
Pittsburgh	115.00	40.00	....	19.00	24.00	.0775	.1125	.086†	.121†	.0675		.....	.125
St. Louis	117.50	35.00	2.00	19.50	24.50	.0775	.1075	.0875†	.118†	.04		.09	.117
San Francisco	.....	50.00	....	12.00	18.00	12.00#	18.00#	12.50#	23.00#	.04		.0575	.19
Seattle	.....	55.00	....	17.00	23.00	17.00#	23.00#	15.00	.....	.03		.19	.20

Note: Paving asphalt, tank car or boat, f.o.b. Maurer, N. J., per ton, Bermudez, $25.00; Trinidad, $21.00. *Per sq. yd. †Per gallon. ‡4½x6x5½ in. §4x5x9-in. Av. aMexican. zlocal reduction due to 20% reduction intra-state class freight rates, only Georgia affected. fPer ton.

CURRENT PRICES OF CONSTRUCTION MATERIALS

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¼-in. billet,	RIVETS ½-in. structural	WIRE NAILS Base	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle bars	Std. spikes	Tie plates	Track bolts
Birmingham	$1.95	$2.10	.....	.....	.....	$36.375	$34.375	$35.00	$2.55	$2.40	$1.90	$3.55
Chicago	1.85	2.10	$3.00	.....	$2.25	36.375	35.00	34.00	2.55	2.40	1.90	3.55
Pittsburgh	1.80	2.05	2.90	$2.60	2.15	36.375	35.00	34.00	2.55	2.40	1.90	3.55

IRON AND STEEL PRODUCTS—BASE MILL PRICES, PER 100 LB., CARLOAD LOTS

F.O.B. WAREHOUSE	STRUCTURAL SHAPES Per 100 lb., base price	REINFORCING BARS Per 100 lb., ¾ in., base price New billet	Rail steel	EXPANDED METAL LATH —Per 100 sq.yd., carload lots— Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING —Per 100 s.f., carload lots— 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in., No. 6 & 6 wires Per sq.yd.	SHEET PILING Per 100 lb., base price
Atlanta	$3.34	$2.32	$2.17	$21.00	$24.00	$1.53	$1.16	$0.1449	$2.65
Baltimore	2.95	2.75	2.60	22.00	25.00	1.41	1.08	.1332	2.75
Boston	3.52	3.03	2.2125	20.50	24.50	1.46	1.12	.1449	2.30
Chicago	3.20	2.10	1.95	22.00	26.00	1.40	1.08	.1323	2.25
Cincinnati	3.40	3.25	3.25	25.01	29.50	1.39	1.07	.1287	.....
Cleveland	3.16	2.60	2.45	20.00	23.00	1.37	1.06	.1287	.....
Dallas	4.00	2.80	2.65	24.50	26.50	1.63	1.23	.1548	2.985
Denver	3.91	3.76	.....	25.00	27.50	1.68	1.26	.1548	.....
Detroit	3.40	2.885	2.885	20.20†	23.60†	1.41	1.08	.1323	2.25
Kansas City	2.75	2.85	2.65	20.50	22.50	1.50	1.14	.1422	2.65
Los Angeles	3.10	2.95	.....	23.00	27.50	1.68	1.26	.1584	2.50
Minneapolis	3.45	2.82	2.67	22.00	26.00	1.51	1.15	.1431	2.55§
Montreal	2.75	3.00	2.80	.....	.....	.....	.....	.....	3.30
New Orleans	.....	.....	.....	19.15	23.00	1.54	1.17	.1458	.....
New York	3.37	2.82	2.67	20.00	22.00	1.43	1.10	.1350	2.48
Philadelphia	2.005	2.34	2.19	20.00	23.50	1.42	1.09	.1332	2.44
Pittsburgh	1.80‡	2.05‡	1.90‡	20.75‡	23.00‡	1.34	1.04	.1260	2.15
St. Louis	3.44	3.04	2.89	22.00	24.00	1.42	1.09	.1341	2.25
San Francisco	3.55	2.475	2.35	23.00	28.00	1.68	1.26	.1584	2.60
Seattle	3.50	2.50	.....	32.00	35.00	1.68	1.26	.1584	2.60

‡Base Mill Price. Note: Shapes, bars and piling subject to quantity discounts. §Mill Price plus freight to Minneapolis. †f.o.b. delivered.

PAINTING AND ROOFING SUPPLIES—F.O.B.

	WHITE LEAD Per 100 lb. keg in oil	READY-MIXED PAINT Per gal., drums Graphite*	Aluminum†	Ferric Oxide‡	ROOFING SUPPLIES Carload lots, f.o.b. factory Rolls, slate surfaced, 85-90 lb., per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating, per gal.	Tar pitch, 350-lb. bbl., per ton
Atlanta	$11.50	$1.60	$3.10	.....	$2.01	$1.97	$2.90	$ .36	$25.40
Baltimore	11.00	1.40	2.25	$1.90	2.32	2.55	2.55	.48	24.60
Birmingham	11.50	2.35	2.35	1.85	1.95	1.79	.....	.36	23.00
Boston	10.25	1.75	2.60	.04½x	2.15	3.25	3.25	.46	20.00
Chicago	11.00	1.85	2.45	1.30	1.60	1.59a	1.59a	.24	20.00
Cincinnati	11.00	1.40	3.00	1.55	2.40	2.39a	2.39a	.36	21.00
Cleveland	11.00	1.65	2.30	1.30	1.60	1.79	1.79a	.24	22.00
Dallas	12.00	1.80	2.24	.....	2.28b	2.30	2.30	.28	34.00
Denver	11.75	2.55	.....	.....	2.75	3.46	3.46	.60	30.00
Detroit	11.00	1.45	2.20	1.30	2.55	2.80	2.80	.37	30.00
Kansas City	11.12½	1.75	2.25	1.85	1.75	1.85	2.25	.35	26.75
Los Angeles	10.75	1.60	2.25	2.30	2.00	1.50	.....	.45	.....
Minneapolis	11.12½	.....	.....	.....	1.60	1.79a	1.79a	.29	25.10
Montreal	9.40	1.70	3.45	1.65	2.00	2.62	2.02	1.40§	1.52§
New York	11.00	1.65	2.25	1.50	1.80	1.79a	1.79a	.232	22.00
Philadelphia	11.00	1.50	2.05	1.50	1.68	1.85a	1.85a	.34	22.00
Pittsburgh	11.00	1.05	1.95	.80	1.75	1.65a	1.65	.38	22.00
St. Louis	11.00	1.85	2.45	1.30	1.87½	3.22	3.22	.28	20.00
San Francisco	10.75	1.80	2.75	1.10–2.00	1.89	3.19	3.10	.38	26.00
Seattle	10.75	1.80	2.85	2.25	3.30	2.66	2.60	.60	30.00

*U. S. War Dept. Spec. 3-49A. †ASTM Spec. D266-31. ‡80% maximum ferric oxide. §Per 100 lb. aPer roll, 65 lb. bPer lb. x500-lb. drums.
Note: Red lead dry, same as white lead in oil, red lead in oil 50c higher.

MISCELLANEOUS ITEMS

WINDOW GLASS

Discounts from latest jobbers list, Sept. 15, 1928

	Single or Double Thickness A quality	B quality
Atlanta	85%	85%
Baltimore	88–10%	90–10%
Birmingham	88%	90%
Boston	88–10–5%	90–10–5%
Chicago	90%	92%
Cincinnati	89–10%	91–10%
Cleveland	89-10%	91-10%
Dallas	88%	92%
Denver	84%	86%
Detroit	87–10%	89–10%
Kansas City	90–10%	90–10%
Los Angeles	90%*	90–40%
Minneapolis	85%	87%
Montreal	.....	.....
New Orleans	88%	90%
New York	88%	90%
Philadelphia	88–30%	90–30%
Pittsburgh	88%	88%
St. Louis	90%	92%
San Francisco	90%	90–[illegible]30%
Seattle	90–10%	90–20%

*Disc. from list Aug. 1, 1929. †F.o.b. Arsenal.

EXPLOSIVES

Per lb. dynamite delivered 50-lb. cases

	Gelatin 40%	60%
Atlanta	$0.155	$0.17
Baltimore	.16	.175
Birmingham	.105	.120
Boston	.165	.1775
Chicago	....	....
Cincinnati	.27	.29
Cleveland	.19	.205
Dallas	.17	.185
Denver	.155	.17
Detroit	.237	.255
Kansas City	.14	.18
Los Angeles	.1725†	.1925†
Minneapolis	.17	.185
Montreal	.1925	.2175
New Orleans	.19	.22
New York	.225	.24
Philadelphia	.....	.....
Pittsburgh	.105	.12
St. Louis	.135	.15
San Francisco	.1575	.1775
Seattle	.1425	.1575

‡Double thickness A & B.

CHEMICALS

Water, sewage treatment, road work, f.o.b., carlots, New York	
Bleaching powder, in drums, f.o.b. works, per 100 lb.	$1.90@$2.15
Calcium chloride, 77-80%, flaked, in 400-lb. drums or 100-lb moisture proof bags, f.o.b. works, freight equalised with points of competition, per ton	19.50
Chlorine, cylinders, per lb. delivered	.05½
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	1.35
Soda ash, 58%, in paper bags, per 100 lb	1.20
Sulphate of aluminum, commercial, in 100 lb. bags per ton	27.00
Sulphate of copper, in bbl., per 100 lb.	3.85

PILES

Prices per linear foot, pine, with bark on f.o.b., New York; delivered from barge, 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Short Leaf Barge	Short Leaf Rail	Long Leaf Barge	Long Leaf Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.11	$0.155	$0.12	$0.15
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.15	.20	.14	.19
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.16	.215	.15	.20½
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.185	.225	.19½	.23½
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.2025	.225	.23½	.29½
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.265	.375	.....	.....
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.305	.442	.....	.....

RAILWAY TIES

Prices f.o.b., per tie, for carload lots:

		6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
Boston	Oak, untreated	$1.15	$1.60
	Pine, untreated	1.15	1.60
	Pine, creosoted	1.60	2.25
New York	Long-leaf sap pine, untreated	.80	1.00
	Mixed oak, untreated	....	1.00
	White oak, untreated	.75	1.50
Birmingham	White oak, creosoted	no market	
	Southern pine, untreated *6"x8"6'	.45*	.60
	Southern pine, creosoted	1.00*	1.20
	White oak, untreated	1.15	1.40
Chicago	Oak, empty cell, creosoted	1.50	1.88
	Oak, zinc treated	1.40	1.70
	Southern pine, creosoted	1.35	1.78
Los Angeles	Fir, untreated	.50	.72
	Fir, creosoted	1.67	2.40
Philadelphia	Red oak, untreated	1.15	1.35
	Red oak, creosoted	1.40	1.65
	White oak, untreated	1.10	1.45
St. Louis	Red oak, untreated	1.08	1.40
	Red oak, creosoted	1.45	1.95
San Francisco	Sap Pine or cypress, untreated	.85	1.25
	Douglas fir, green, untreated	.45	.63
	Douglas fir, empty cell, creosoted	1.14	1.56
Montreal	Birch or maple, untreated	1.00	1.00
	Birch or maple, creosoted	1.25	1.55

CURRENT PRICES OF CONSTRUCTION MATERIALS

WATER, SEWER AND DRAIN PIPE

	C. I. PIPE	VITRIFIED SEWER PIPE				CLAY DRAIN TILE		CONCRETE SEWER PIPE		WROUGHT STEEL PIPE			
	Per net ton, f.o.b. 6 in. and over*	Per foot, delivered, standard (‡ f.o.b.) 8 in., s.s.	12 in., s.s.	24 in., d.s.	36 in., d.s.	Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	Per ft., delivered; ASTM C 14-24 12 in.	24 in.	Full standard weight. # 1 to 3 in., Black	1 to 3 in., Butt Weld Galv.	3½ to 6 in., Lap Weld Black	3½ to 6 in., Lap Weld Galv.
Atlanta	$42.00	$0.225	$0.405	$1.4625	$3.25	$80.00	$128.00	$0.55	$1.60	44%	37%	42%	34%
Baltimore	45.50	.24	.46	2.05	5.65	105.00	165.00	.75	2.00				
Birmingham	38.00	.25	.45	1.625	4.66	85.00	200.00	.45	1.60	48.939%	37.918%	50.162%	39.143%
Boston	45.50	.231	.4455	2.025	5.945	60.10	101.00	.54	2.00				
Chicago	46.50	.28	.54	1.98	5.60	85.00	120.00	.675	2.25	56%	45%	55%	52%
Cincinnati	45.00	.231	.4455	1.935	5.8425	69.00	108.00	.40	1.40	53.04%	42.02%	54.265%	43.243%
Cleveland	46.50	.21	.405	1.71	5.2275	47.25	72.00	.536	2.102	58.4%	48.4%	60.6%	49.6%
Dallas	50.00	.27	.486	1.944	.....	120.00	150.00	.45	1.57	64%	55%	65–5%	56.5%
Denver	58.00	.23‡	.415‡	1.73‡	.....	.....	.....	.....	.....	56%	45%	43%*	57%*
Detroit	46.50	.238	.456	1.935	5.74	58.10	97.20	.35	1.55	48.6%	38.2%	47.3%	37.6%
Kansas City	48.00	.32	.57	2.25	4.85	.....	.....	.85	2.25	.....	.....	.....	.....
Los Angeles	46.50	.2825‡	.508‡	2.03‡	5.535‡	115.50	192.50	1.00	2.00	53.57%	43%	53%	42.51%
Minneapolis	48.50	.283	.51	2.04	5.13	.....	.....	.50	1.33	.....	.....	.....	.....
Montreal	.....	.80	1.50	6.00	.....	45.00	90.00	.45	.....	.....	.....	.....	.....
New Orleans	44.00	.282	.465	1.65	.....	60.00	.....	.51	1.69	.....	.....	.....	.....
New York	45.00	.322	.621	2.73	7.60	.....	.....	.55	2.00	51.88%*	40.86%*	53.10%*	42.08%*
Philadelphia	42.00	.315	.6075	2.70	.....	150.00	230.00	.....	.....	52.37%*	41.35%*	53.39%*	42.57%*
Pittsburgh	48.00	.224‡	.432‡	1.845‡	5.535‡	69.00	108.00	.75	1.75	64%	55%	65%	56%
St. Louis	45.00	.27	.486	1.944	3.96	85.00	172.00	.80	2.28	51.51%	40.49%	52.74%	41.71%
San Francisco	46.00	.265	.477	1.908	5.22	105.00	175.00	.45	2.20	52.4%	63.4%	51.1%	64.6%
Seattle	47.50	.50	.90	3.60	9.00	85.00	200.00	1.50	1.60	60.3%	51.3%	65.3%	52.3%

*b. & s. class B and heavier, C/L lots. Burlington, N. J. (base) $42.00. Gas pipe and class A, $3 per ton additional, 4-in., $3 per ton additional.

‡Price at factory.

#Discounts from standard list for delivery from warehouse, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ¼ in., 8½c; ⅜ in. 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92.

*2½ to 3 in. *Resale price to consumer, car load lots shipped from mill.

LUMBER AND TIMBER—PER M FT. B.M., CARLOAD LOTS F.O.B.

		SHORT LEAF YELLOW PINE AND DOUGLAS FIR								LONG LEAF Y. P.	
		All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. All Fir planks No. 2 common; Fir timber is No. 1 common. Lengths up to 20 ft.								Merchantable grade up to 20 ft.	
		1x6, S4S	1x8, S4S	2x4, S4S	2x6, S4S	2x8, S4S	2x10, S4S	3x12, Rgh.	6x12, Rgh.	12x12, Rgh.	2x12, Rgh.	12x12, Rgh.
Atlanta	Southern Pine	$16.00	$17.00	$19.50	$16.50	$18.00	$18.50	$30.00	.....	.....	$38.50	$40.00
Baltimore	Southern Pine	23.00	24.00	29.50	28.50	29.60	30.50	37.50			54.00	55.00
	Douglas Fir	29.00	29.00	31.00	29.00	30.00	30.50	30.00	$30.00	$30.00		
Birmingham	Long Leaf	18.25	19.25	21.25	19.25	20.25	20.25	42.00			32.00	39.80
	Southern Pine	18.25	19.25	20.00	18.00	19.00	19.00	29.00	29.00	28.00	.....	.....
Boston	Southern Pine	33.00	35.00	40.00†	42.00†	59.00‡	68.00‡	78.00‡	.....	.....	78.00	78.00
	Douglas Fir	31.25	33.50	40.50	41.00	41.00	41.00	44.00	44.00	44.00	.....	.....
Chicago	Southern Pine	27.00	28.00	33.50	30.00	31.00	32.80	45.00	.....	.....	54.00	58.00
	Douglas Fir	28.50	29.50	31.75	30.50	30.50	28.50	40.75	41.75	41.75	.....	.....
Cincinnati	Southern Pine	26.00	27.00	27.50	25.50	26.50	27.50	43.50	.....	.....	43.50	.....
	Douglas Fir	.....	.....	.....	.....	.....	.....	46.25	46.25	46.25	.....	.....
Cleveland	Southern Pine	27.00	28.00	31.00	28.00	30.00	30.50	45.00	45.00	.....	46.00	57.00§
Dallas	Southern Pine	26.25	27.10	29.02	26.27	27.92	28.72	42.44	.....	.....	47.55	55.55
	Douglas Fir	29.45	30.53	33.28	30.53	38.64	32.45	44.85	44.85	44.85	.....	.....
Denver	Douglas Fir	34.00	36.50*=	39.00*	38.00*	38.00*	41.00*	49.00*	53.00*	58.50		
Detroit	Southern Pine	26.00	27.50	30.00	27.00	30.00	32.00	37.00			32.00	43.75
	Douglas Fir	.....	.....	.....	.....	.....	.....	43.25	44.25	44.25	.....	.....
Los Angeles	Douglas Fir	27.00„	28.50„	28.50„	25.00„	25.50„	25.50„	35.00„	38.00„	34.00„	.....	.....
Minneapolis	Western Pine	44.00*	41.25*	34.00*	31.50*	33.00*	31.50*	50.75*‡			.....	.....
	Douglas Fir	33.25*	34.50*	36.00*	33.50*	35.00*	37.00*	47.00*	50.75*	50.75*	.....	.....
Montreal	Spruce	30.00	31.00	27.00	29.00	30.00	35.00	38.00			.....	.....
	Douglas Fir	42.50	42.50	42.50	44.00	44.00	45.75	51.00	51.00	51.00	43.00	.....
New Orleans	Southern Pine	27.90	28.95	33.70	28.90	31.35	32.40	43.95	.....	.....	45.65	52.45
	Douglas Fir	28.95	31.50	33.90	29.35	32.90	33.95	37.95	.....	.....	.....	.....
New York	Southern Pine	32.50*	34.00*	32.50*	34.00*	35.00*	36.00*	47.00*			75.00*	75.00=
	Douglas Fir	.....	.....	38.00*	37.00*	38.00*	39.00*	37.00*	39.00*	39.00*	.....	.....
Philadelphia	Southern Pine	24.50	25.50	27.00	25.50	26.50	27.00	31.00	.....	.....	61.00	59.00
	Douglas Fir	.....	.....	31.00	31.00	31.00	31.00	32.50	32.50	33.50	.....	.....
Pittsburgh	Southern Pine	26.50	27.75	32.75	29.25	31.75	32.75	41.50	.....	.....	57.50	57.50
	Douglas Fir	33.50	34.50	34.50	33.50	34.00	34.25	46.25	46.25	46.25	.....	.....
St. Louis	Southern Pine	29.50*	31.00*	33.50*	30.00*	32.50*	33.50*	55.50*			49.50*	71.00*
	Douglas Fir							55.50*	54.50*	54.50*	.....	.....
San Francisco	Douglas Fir	15.00‹	16.00‹	17.00‹	14.50‹	15.50‹	16.50‹	21.00‹	21.00‹	21.00‹	.....	.....
Seattle	Douglas Fir	13.00	14.00	14.00	11.50	12.50	12.00	18.50	18.00	18.00	.....	.....

*Delivered. †Spruce. ‡Long-leafed Y. P. §Norway Pine. ▪Northern Pine. ‹Douglas fir. =Native. ‡At ship's tackle. „Yard prices.

CURRENT BUILDING AND CONSTRUCTION WAGE RATES PER HOUR

	Bricklayers	Carpenters	Structural Iron Workers	Hoisting Engineers	Plasterers	Common Labor	
						Building	Heavy Const.
Atlanta	$0.70/1.125	$0.40/.90	$0.60/1.25	$0.60/1.25	$0.60/1.00	$0.30/.40	$0.30/.40
Baltimore	1.25	1.10	1.37½	1.25	1.25	.45	.40
Birmingham	1.00	.60/1.00	1.00	1.125	1.00	.30/.40†	.30/.40†
Boston	1.20	.70/1.17½	1.20	.90/1.37½	1.37½	.40/.70	.40/.70
Cincinnati	1.27½	1.02½	1.20	1.07½	1.27½	.45	.40
Chicago	1.50	1.31¼	1.35	1.31¼	1.50	.82½	.82½
Cleveland	1.25	1.12½	1.25	1.25	1.25	.72	.72
Dallas	1.25	1.00	1.25	.85	1.25	.45	.40
Denver	.60/1.12½	.60/.87½	.60/.87½	.60/.87½	.....	.50	.50
Detroit	1.25	1.00	1.25	.75/.95	1.25	.50	.50/.70
Kansas City	1.32½	1.12½	1.25	1.12½	1.12	.50/.60	.60/.75
Los Angeles	1.10	1.10	1.125	1.10	1.25	.50	.60
Minneapolis	.90/1.00	.75	.90	.75	.90	.40	.50
New Orleans	1.00	.75	1.00	1.00	1.25	.30/.40	.30/.40
New York	1.50	1.40	1.45/1.65	1.50/1.56½	1.50	.82½	.55/.93¾
Philadelphia	.75/1.20	.60/1.20	1.00/1.20	.75/1.20	.60/1.20	.30/50	.30/.50
Pittsburgh	.50/1.00	.50/1.00	.50/1.00	.50/1.00	.50/1.00	.35/.50	.35/.50
St. Louis	1.50	1.25	1.47	1.35/1.47	1.50	.78½	.35/.78
San Francisco	1.50*	1.10	1.37½	1.12½	1.25*	.62½	.60
Seattle	.90	.90	1.00	1.00	.90	.45	.50
Montreal	0.70	.60	.75	.55	.67	.35	.25

Skilled Avg: (Bricklayers, Carpenters, Ironworkers) $1.1039. Common Avg. $0.5241 *6-hr. Day. † PWA.